Monday, February 23, 2026
Regular Board of Education

To accommodate additional attendees, the meeting will also be held virtually via an expanded Zoom platform. All or a portion of the meeting is being video recorded for purpose of public broadcast.

Regular Board of Education, Band Room, C38 Cary Jr. High School, 2109 Crystal Lake Rd., Cary, IL 60013, 6:00 PM

1. **Organization**
   - 1.1. Call to Order
   - 1.2. Pledge of Allegiance
   - 1.3. Roll Call
2. **Community Input**
   - 2.1. Staff Recognition
   - 2.2. School Highlight - Cary Jr. High
   - 2.3. Members of the public and District employees may make public comments at this time. Please identify yourself and limit your comments to 3 (three) minutes.
3. **Open Forum**
   - 3.1. Board
4. **Superintendent Update**
5. **Teaching & Learning Update**
6. **Committee of the Whole Update**
7. **Consent Agenda**
   - 7.1. January 5, 9, 10, 12, 20 and 21, 2026, Special Board Meeting Closed Session Minutes
   - 7.2. January 5, 9, 12, 21 Special Board of Education Open Session Minutes
   - 7.3. January 26, 2026, Regular Board of Education Open and Closed Session Minutes
   - 7.4. Monthly Bills and Payroll
   - 7.5. Treasurer's Report
   - 7.6. Resignation/Dismissal/Retirement
   - 7.7. Employment - None
   - 7.8. Destruction of Closed Meeting Audio Recordings
   - 7.9. Disposal of Assets - None
   - 7.10. FY27 Balanced Budget Resolution
   - 7.11. Resolution to Approve Designee for Tentative Budget
   - 7.12. Facility Usage Fees
   - 7.13. Staffing Plan

7.14. Tech Plan

8. **Board Discussion and Action**

8.1. Approval of Construction Bid Approval for Summer 2026

8.2. Approval of New Superintendent Contract commencing July 1, 2026, through June 30, 2027

8.3. Approval of New Assistant Superintendent of Special Services to begin July 1, 2026

8.4. Approval of Agreement to Phase Out Trademark Logo

9. **Topics for Discussion - None**

10. **Closed Session**

10.1. Security procedures, school building safety and security, and the use of personnel and equipment to respond to an actual, a threatened, or a reasonably potential danger to the safety of employees, students, staff, the public or public property. 5 ILCS 120/2(c)(8)

11. **Adjournment**

Freedom of Information
Board Report
February

Date of Request	Requestor	Subject	Date Completed
1.26.26	Yvonne Tovar	"The total number of Food Service and Cooks currently employed, broken down by individual school. 2. The guaranteed or scheduled hours per day for Food Service and Cooks at each school. 3. Seniority information about Food Service and Cooks, listed by school, including length of service. 4. Copies of the official job description(s) for Food Service and Cooks by title (Cooks, Food Service, Food service Lead, etc.). 5. The current rate of pay, including hourly wages and any step or pay scale used. 6. Information regarding benefits provided to Food Service and Cooks, including but not limited to health insurance, retirement benefits, paid leave, and any other applicable benefits"	2.2.26
2.9.26	Jill Aleonar	"DCN is requesting the following information: · Confirm the bid date and time listed above are unchanged. · Construction cost estimate or a construction cost range for the project. · Mandatory pre-bid Attendance List · When is the best time to follow up for bid results "	2.19.26
2.9.26	Jill Aleonar	"DCN is requesting the following information: • Bid Tabulation • If none, do you have the low bidders or apparent low bidders as read aloud at the public bid opening? • How much is the base bid amount? • If no low bid information is available at this time, when would be the best time to contact you for the information or the contract award?"	2.19.26
2.18.26	Julie Dustin	"Deer Path Elementary School & Three Oaks Elementary School Renovations & Improvements I am looking for the companies who submitted bids and their bid amount."	2.19.26

Freedom of Information
Board Report
February

2.11.26	Bob Roberts	"I am emailing you in regards to the "Deer Path & Three Oaks Elem School Renovations" that bid 2/10. Please send us the bid tabulation. If the bid tabulation is not available, please let us know the 3 lowest bidders and their base bid as read aloud. "	2.19.26
2.13.26	Jacqueline Garretson	"Id like to foia any email or communication to or from Carlos Acosta, McHenry County Rapid Response Team, 855-435-7693, mchenrycorrt@gmail.com. Please send over via email. Let's do within the past 90 days. "	2.19.26

CARY COMMUNITY CONSOLIDATED SCHOOL DISTRICT
OFFICE OF THE SUPERINTENDENT

2115 Crystal Lake Road • Cary, Illinois 60013 • (224) 357-5100 • Fax (847) 639-3898
Briargate • Deer Path • Oak Knoll • Three Oaks • Cary Junior High

Dr. Jennifer Thomas	**Ms. Ivette Rivera**	**Ms. Kimberly Dahlem**	**Mr. David Shepherd**	**Mr. Brian DeRoo**
Interim Superintendent	Associate Superintendent of Teaching and Learning	Interim Director Special Services & Instruction	Associate Superintendent of Finance and Operations	Director of Human Resources

February 2, 2026

Yvonne Tovar
Region 23 UniServ Director
Illinois Education Association-NEA
VIA ELECTRONIC MAIL
Yvonne.Tovar@ieanea.org

RE: FOIA REQUEST
Dear Ms. Tovar,

Thank you for writing to Cary Community Consolidated School District No. 26 with your request for information pursuant to the Illinois *Freedom of Information Act*, 5 ILCS 140/1 *et seq*.

On January 26, you requested the following:

"1.The total number of Food Service and Cooks currently employed, broken down by individual school.
2. The guaranteed or scheduled hours per day for Food Service and Cooks at each school.
3. Seniority information about Food Service and Cooks, listed by school, including length of service.
4. Copies of the official job description(s) for Food Service and Cooks by title (Cooks, Food Service, Food service Lead, etc.).
5. The current rate of pay, including hourly wages and any step or pay scale used.
6. Information regarding benefits provided to Food Service and Cooks, including but not limited to health insurance, retirement benefits, paid leave, and any other applicable benefits"

Response: All food service employees that work in the district are employees of the district's contracted food service vendor, OrganicLife and are not school district employees. OrganicLife is not a public body and has advised the district that the production of this information is exempt under FOIA (5 ILCS 140/7(g)), as that material constitutes the company's confidential proprietary commercial information.

Please find attached records responsive to your request. As the District FOIA Officer, I am responsible for the District's response to your request. If I have misunderstood or misinterpreted your request in any way, please clarify your request to me in writing.

Very truly yours,

Jessica Neal, FOIA Officer

ILLINOIS EDUCATION ASSOCIATION

Requester: Yvonne Tovar
Address: 1707 North Randall Road, Suite 155
Elgin, IL 60123
Phone: 847.428.7640
Email: yvonne.tovar@ieanea.org

Date: January 26, 2026

RE: Freedom of Information Act Request

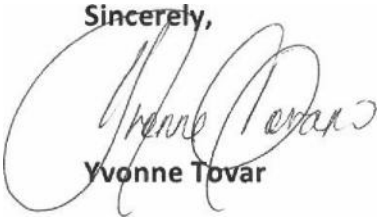
To: FOIA officer

I am formally requesting an electronic list (Excel is preferred) that includes the following information regarding the Food Service Lead, Cooks, and all Food Service employees in your district.

1. The total number of Food Service and Cooks currently employed, broken down by individual school.
2. The guaranteed or scheduled hours per day for Food Service and Cooks at each school.
3. Seniority information about Food Service and Cooks, listed by school, including length of service.
4. Copies of the official job description(s) for Food Service and Cooks by title (Cooks, Food Service, Food service Lead, etc.).
5. The current rate of pay, including hourly wages and any step or pay scale used.
6. Information regarding benefits provided to Food Service and Cooks, including but not limited to health insurance, retirement benefits, paid leave, and any other applicable benefits

I am requesting a fee waiver because, according to the law, the information requested is in the public interest because it contributes significantly to the public's understanding of the District's operations and is not for commercial gain. Please send the all the information in via electronic mail to yvonne.tovar@ieanea.org.

Sincerely,



Region 23 UniServ Director IEA/NEA

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Interim Superintendent	Associate Superintendent of Teaching and Learning	Interim Director Special Services & Instruction	Associate Superintendent of Finance and Operations	Director of Human Resources

February 19, 2026

Jill Aleonar
Bid Information Researcher
Dodge Construction Network

VIA ELECTRONIC MAIL
Jill.Aleonar@construction.com

RE: FOIA REQUEST

Dear Ms. Aleonar,

Thank you for writing to Cary Community Consolidated School District No. 26 with your request for information pursuant to the Illinois *Freedom of Information Act*, 5 ILCS 140/1 *et seq*.

On February 11, you requested the following:

"Dodge Construction Network wants to ensure we have the most complete
and accurate information regarding Deer Path & Three Oaks Elem School Renovations that is bidding on 02/10/2026

DCN is requesting the following information:

- Bid Tabulation
- If none, do you have the low bidders or apparent low bidders as read aloud at the public bid opening?
- How much is the base bid amount?
- If no low bid information is available at this time, when would be the best time to contact you for the information or the contract award?"

Response: Please see attached Bid Tabulation sheet. Contract Award is scheduled to be finalized at February 23rd Board of Education Meeting.

Please find attached records responsive to your request. As the District FOIA Officer, I am responsible for the District's response to your request. If I have misunderstood or misinterpreted your request in any way, please clarify your request to me in writing.

Very truly yours,

Jessica Neal, FOIA Officer

Outlook

FW: Deer Path & Three Oaks Elem School Renovations

From David Martin <david.martin@cary26.org>
Date Thu 2/12/2026 8:35 AM
To Laura Dorfler <laura.dorfler@cary26.org>; Jessica Neal <jessica.neal@cary26.org>
Cc David Martin <david.martin@cary26.org>

1 attachment (55 KB)
Bid Tabulation for Deer Path and Three Oaks.pdf;

Good Morning Jess and Laura,
Answers in Green below. Reply to the FOIA as needed.
Sincerely,
David Martin

From: Jill Aleonar <Jill.Aleonar@construction.com>
Sent: Wednesday, February 11, 2026 3:13 PM
To: David Martin <david.martin@cary26.org>
Subject: Re: Deer Path & Three Oaks Elem School Renovations

You don't often get email from jill.aleonar@construction.com. Learn why this is important

**Caution: This is email was sent from an external email domain. Please take care when clicking links or opening attachments. When in doubt, contact your Technology Support Specialist.

Good day,

Dodge Construction Network wants to ensure we have the most complete and accurate information regarding Deer Path & Three Oaks Elem School Renovations that is bidding on 02/10/2026

DCN is requesting the following information:

- Bid Tabulation See attached Bid Tabulation Sheet.
- If none, do you have the low bidders or apparent low bidders as read aloud at the public bid opening? See attached Bid Tabulation Sheet.
- How much is the base bid amount? See attached Bid Tabulation Sheet.
- If no low bid information is available at this time, when would be the best time to contact you for the information or the contract award? Contract award is scheduled to be finalized at February 23rd Board of Education Meeting.

Thank you for your time and assistance,

DODGE NUMBER:

Jill Aleonar

Bid Information Researcher
P 844-326-3826 ext 9505
Jill.Aleonar@construction.com

DODGE CONSTRUCTION NETWORK

From: Jill Aleonar
Sent: Monday, February 9, 2026 2:07 PM
To: david.martin@cary26.org <david.martin@cary26.org>
Subject: Deer Path & Three Oaks Elem School Renovations

Good day,

Dodge Construction Network wants to ensure we have the most complete and accurate information regarding Deer Path & Three Oaks Elem School Renovations that is bidding on 02/10/2026

DCN is requesting the following information:

- Confirm the bid date and time listed above are unchanged.
- Construction cost estimate or a construction cost range for the project.
- Mandatory pre-bid Attendance List
- When is the best time to follow up for bid results

Thank you for your time and assistance,

Jill Aleonar

Bid Information Researcher
P 844-326-3826 ext 9505
Jill.Aleonar@construction.com

DODGE CONSTRUCTION NETWORK

Disclaimer

The information contained in this communication from the sender is confidential. It is intended solely for use by the recipient and others authorized to receive it. If you are not the recipient, you are hereby notified that any disclosure, copying, distribution or taking action in relation of the contents of this information is strictly prohibited and may be unlawful.

BID TABULATION SHEET

Project Number: CSG840
Project: Deer Path / Three Oaks School Renovations

Date: February 10, 2026
Time: 2:00 P.M.
Location: Cary SD26

BIDDING INFORMATION							BASE BID	ALTERNATE ONE	TOTAL
BIDDERS	INFO			ADDENDUM RECEIPT					
	QUAL	BOND	CK	1	2				
Boller Construction Waukegan, IL	X	X		X	X		$10,729,300	$341,300	$11,070,600
Carmichael Construction							NO BID		
Kandu Construction							NO BID		
Manusos General Contracting Fox Lake, IL	X	X		X	X		$11,043,177	$310,000	$11,353,177
Path Construction Company							NO BID		
Sollitt Construction							NO BID		
Tyler Lane Construction Rosemont, IL	**X**	**X**		**X**	**X**		**$10,269,621**	**$345,498**	**$10,615,119**
Wm. Tonyan & Son.							NO BID		

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Interim Superintendent	Associate Superintendent of Teaching and Learning	Interim Director Special Services & Instruction	Associate Superintendent of Finance and Operations	Director of Human Resources

February 19, 2026

Jill Aleonar
Bid Information Researcher
Dodge Construction Network

VIA ELECTRONIC MAIL
Jill.Aleonar@construction.com

RE: FOIA REQUEST

Dear Ms. Aleonar,

Thank you for writing to Cary Community Consolidated School District No. 26 with your request for information pursuant to the Illinois *Freedom of Information Act*, 5 ILCS 140/1 *et seq*.

On February 5, you requested the following:

"Dodge Construction Network wants to ensure we have the most complete and accurate information regarding Deer Path & Three Oaks Elem School Renovations that is bidding on 02/10/2026

DCN is requesting the following information:

- Confirm the bid date and time listed above are unchanged.
- Construction cost estimate or a construction cost range for the project.
- Mandatory pre-bid Attendance List
- When is the best time to follow up for bid results"

Response: Bid date and time are confirmed. Please see Bid Tabulation sheet for construction cost estimate, mandatory pre-bid meeting attendance, and bid results.

Please find attached records responsive to your request. As the District FOIA Officer, I am responsible for the District's response to your request. If I have misunderstood or misinterpreted your request in any way, please clarify your request to me in writing.

Very truly yours,

Jessica Neal, FOIA Officer

Outlook

FW: Deer Path & Three Oaks Elem School Renovations

From Laura Dorfler <laura.dorfler@cary26.org>
Date Thu 2/5/2026 11:05 AM
To David Martin <david.martin@cary26.org>; Jessica Neal <jessica.neal@cary26.org>

Hi,
I am considering this a FOIA however, Dave you can confirm the dates of the bid date and time. We will have 21 days to respond.
Thank you.

Laura Dorfler
Executive Administrative Assistant
to the Superintendent and Board of Education
Cary Community School District 26
www.cary26.org

From: Jill Aleonar <Jill.Aleonar@construction.com>
Sent: Thursday, February 5, 2026 10:47 AM
To: Laura Dorfler <laura.dorfler@cary26.org>
Subject: Deer Path & Three Oaks Elem School Renovations

You don't often get email from jill.aleonar@construction.com. Learn why this is important

Caution: This is email was sent from an external email domain. Please take care when clicking links or opening attachments. When in doubt, contact your Technology Support Specialist.

Good day,

Dodge Construction Network wants to ensure we have the most complete and accurate information regarding Deer Path & Three Oaks Elem School Renovations that is bidding on 02/10/2026

DCN is requesting the following information:

- Confirm the bid date and time listed above are unchanged.
- Construction cost estimate or a construction cost range for the project.
- Mandatory pre-bid Attendance List
- When is the best time to follow up for bid results

Thank you for your time and assistance,

Jill Aleonar

Bid Information Researcher
P 844-326-3826 ext 9505
Jill.Aleonar@construction.com

DODGE CONSTRUCTION NETWORK

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BID TABULATION SHEET

Project Number: CSG840
Project: Deer Path / Three Oaks School Renovations

Date: February 10, 2026
Time: 2:00 P.M.
Location: Cary SD26

BIDDING INFORMATION							BASE BID	ALTERNATE ONE	TOTAL
BIDDERS	INFO			ADDENDUM RECEIPT					
	QUAL	BOND	CK	1	2				
Boller Construction Waukegan, IL	X	X		X	X		$10,729,300	$341,300	$11,070,600
Carmichael Construction							NO BID		
Kandu Construction							NO BID		
Manusos General Contracting Fox Lake, IL	X	X		X	X		$11,043,177	$310,000	$11,353,177
Path Construction Company							NO BID		
Sollitt Construction							NO BID		
Tyler Lane Construction Rosemont, IL	**X**	**X**		**X**	**X**		**$10,269,621**	**$345,498**	**$10,615,119**
Wm. Tonyan & Son.							NO BID		

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Interim Superintendent	Associate Superintendent of Teaching and Learning	Interim Director Special Services & Instruction	Associate Superintendent of Finance and Operations	Director of Human Resources

February 19, 2026

Julie Dustin
Product Development Editor
DataBid

VIA ELECTRONIC MAIL
julie@databid.com

RE: FOIA REQUEST

Dear Mr. Dustin,

Thank you for writing to Cary Community Consolidated School District No. 26 with your request for information pursuant to the Illinois *Freedom of Information Act*, 5 ILCS 140/1 *et seq*.

On February 18, you requested the following:

"FOIA Deer Path Elementary School & Three Oaks Elementary School Renovations & Improvements I am looking for the companies who submitted bids and their bid amount."

Please find attached records responsive to your request. As the District FOIA Officer, I am responsible for the District's response to your request. If I have misunderstood or misinterpreted your request in any way, please clarify your request to me in writing.

Very truly yours,

Jessica Neal, FOIA Officer

Outlook

FOIA Deer Path Elementary School & Three Oaks Elementary School Renovations & Improvements

From julie dustin <julie@databid.com>
Date Wed 2/18/2026 8:07 PM
To Jessica Neal <jessica.neal@cary26.org>

> ****Caution:** This is email was sent from an external email domain. Please take care when clicking links or opening attachments. When in doubt, contact your Technology Support Specialist.

Hi Jessica,

Happy Thursday!

I am looking for the companies who submitted bids and their bid amount.

Thank you for your time.

DataBid

Julie Dustin
Product Development Editor
T: 630.338.1460 | F: 888.929.9293
E: julie@databid.com | W: www.databid.com

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BID TABULATION SHEET

Project Number: CSG840
Project: Deer Path / Three Oaks School Renovations

Date: February 10, 2026
Time: 2:00 P.M.
Location: Cary SD26

BIDDING INFORMATION							BASE BID	ALTERNATE ONE	TOTAL
BIDDERS	INFO			ADDENDUM RECEIPT					
	QUAL	BOND	CK	1	2				
Boller Construction Waukegan, IL	X	X		X	X		$10,729,300	$341,300	$11,070,600
Carmichael Construction							NO BID		
Kandu Construction							NO BID		
Manusos General Contracting Fox Lake, IL	X	X		X	X		$11,043,177	$310,000	$11,353,177
Path Construction Company							NO BID		
Sollitt Construction							NO BID		
Tyler Lane Construction Rosemont, IL	**X**	**X**		**X**	**X**		**$10,269,621**	**$345,498**	**$10,615,119**
Wm. Tonyan & Son.							NO BID		

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Interim Superintendent	Associate Superintendent of Teaching and Learning	Interim Director Special Services & Instruction	Associate Superintendent of Finance and Operations	Director of Human Resources

February 19, 2026

Bob Roberts
Dodge Construction Network

VIA ELECTRONIC MAIL
bob.roberts@construction.com

RE: FOIA REQUEST

Dear Mr. Roberts

Thank you for writing to Cary Community Consolidated School District No. 26 with your request for information pursuant to the Illinois *Freedom of Information Act*, 5 ILCS 140/1 *et seq*.

On February 11, you requested the following:

"I am emailing you in regards to the "Deer Path & Three Oaks Elem School Renovations" that bid 2/10. Please send us the bid tabulation. If the bid tabulation is not available, please let us know the 3 lowest bidders and their base bid as read aloud."

Please find attached records responsive to your request. As the District FOIA Officer, I am responsible for the District's response to your request. If I have misunderstood or misinterpreted your request in any way, please clarify your request to me in writing.

Very truly yours,

Jessica Neal, FOIA Officer

Outlook

FW: Deer Path & Three Oaks Elem School Renovations

From Laura Dorfler <laura.dorfler@cary26.org>
Date Wed 2/11/2026 9:24 AM
To Jessica Neal <jessica.neal@cary26.org>; David Martin <david.martin@cary26.org>

Good morning,
Please see FOIA request below.
Thank you.

Laura Dorfler
Executive Administrative Assistant
to the Superintendent and Board of Education
Cary Community School District 26
www.cary26.org

From: Bob Roberts <bob.roberts@construction.com>
Sent: Wednesday, February 11, 2026 9:01 AM
To: Laura Dorfler <laura.dorfler@cary26.org>
Subject: Deer Path & Three Oaks Elem School Renovations

You don't often get email from bob.roberts@construction.com. Learn why this is important

**Caution: This is email was sent from an external email domain. Please take care when clicking links or opening attachments. When in doubt, contact your Technology Support Specialist.

Hello,

I am emailing you in regards to the "Deer Path & Three Oaks Elem School Renovations" that bid 2/10. Please send us the bid tabulation. If the bid tabulation is not available, please let us know the 3 lowest bidders and their base bid as read aloud.

Your assistance can greatly reduce inquiries to your office by ensuring we can share the results of the bid with the construction community.

Thanks for your time,

Bob Roberts

Dodge Construction Network
Construction Network

DODGE CONSTRUCTION NETWORK

Dodge Project Number 202600006951

BID TABULATION SHEET

Project Number: CSG840
Project: Deer Path / Three Oaks School Renovations

Date: February 10, 2026
Time: 2:00 P.M.
Location: Cary SD26

BIDDING INFORMATION							BASE BID	ALTERNATE ONE	TOTAL
BIDDERS	INFO			ADDENDUM RECEIPT					
	QUAL	BOND	CK	1	2				
Boller Construction Waukegan, IL	X	X		X	X		$10,729,300	$341,300	$11,070,600
Carmichael Construction							NO BID		
Kandu Construction							NO BID		
Manusos General Contracting Fox Lake, IL	X	X		X	X		$11,043,177	$310,000	$11,353,177
Path Construction Company							NO BID		
Sollitt Construction							NO BID		
Tyler Lane Construction Rosemont, IL	**X**	**X**		**X**	**X**		**$10,269,621**	**$345,498**	**$10,615,119**
Wm. Tonyan & Son.							NO BID		

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Interim Superintendent	Associate Superintendent of Teaching and Learning	Interim Director Special Services & Instruction	Associate Superintendent of Finance and Operations	Director of Human Resources

February 19, 2026

Jacqueline Garretson

VIA ELECTRONIC MAIL
mjbmabene@gmail.com

RE: FOIA REQUEST

Dear Ms. Garretson,

Thank you for writing to Cary Community Consolidated School District No. 26 with your request for information pursuant to the Illinois *Freedom of Information Act*, 5 ILCS 140/1 *et seq*.

On February 13, you requested the following:

"Id like to foia any email or communication to or from Carlos Acosta, McHenry County Rapid Response Team, 855-435-7693, mchenrycorrt@gmail.com. Let's do within the past 90 days. "

Response: After a search for records responsive to your FOIA request, at this time, the District has no responsive records.

Please find attached records responsive to your request. As the District FOIA Officer, I am responsible for the District's response to your request. If I have misunderstood or misinterpreted your request in any way, please clarify your request to me in writing.

Very truly yours,

Jessica Neal, FOIA Officer

Outlook

Foia

From Abene Family <mjbmabene@gmail.com>
Date Fri 2/13/2026 10:44 AM
To D26 FOIA <foia@cary26.org>

****Caution:** This is email was sent from an external email domain. Please take care when clicking links or opening attachments. When in doubt, contact your Technology Support Specialist.

Hello

Id like to foia any email or communication to or from Carlos Acosta, McHenry County Rapid Response Team, 855-435-7693, mchenrycorrt@gmail.com. Please send over via email.

Thank you

Jacqueline Garretson

Outlook

Re: Foia

From Jessica Neal <jessica.neal@cary26.org>
Date Tue 2/17/2026 9:20 AM
To Abene Family <mjbmabene@gmail.com>

Hello Ms. Garretson,

Thank you for your FOIA request.

To help us accurately process your request, could you please provide a specific date range for the emails or communications you are seeking involving Carlos Acosta and the McHenry County Rapid Response Team? A timeframe will allow us to conduct a more efficient and thorough search.

Once we receive that information, we will proceed accordingly.

Jess Neal
FOIA Officer

From: Abene Family <mjbmabene@gmail.com>
Sent: Friday, February 13, 2026 10:44 AM
To: D26 FOIA <foia@cary26.org>
Subject: Foia

> ****Caution:** This is email was sent from an external email domain. Please take care when clicking links or opening attachments. When in doubt, contact your Technology Support Specialist.

Hello

Id like to foia any email or communication to or from Carlos Acosta, McHenry County Rapid Response Team, 855-435-7693, mchenrycorrt@gmail.com. Please send over via email.

Thank you

Jacqueline Garretson

Outlook

Re: Foia

From Abene Family <mjbmabene@gmail.com>
Date Tue 2/17/2026 9:21 AM
To Jessica Neal <jessica.neal@cary26.org>

You don't often get email from mjbmabene@gmail.com. Learn why this is important

Caution: This is email was sent from an external email domain. Please take care when clicking links or opening attachments. When in doubt, contact your Technology Support Specialist.

Hi Jessica

Let's do within the past 90 days.

Thank you

On Tue, Feb 17, 2026, 9:20 AM Jessica Neal <jessica.neal@cary26.org> wrote:

> Hello Ms. Garretson,
>
> Thank you for your FOIA request.
>
> To help us accurately process your request, could you please provide a specific date range for the emails or communications you are seeking involving Carlos Acosta and the McHenry County Rapid Response Team? A timeframe will allow us to conduct a more efficient and thorough search.
>
> Once we receive that information, we will proceed accordingly.
>
> Jess Neal
> FOIA Officer

From: Abene Family <mjbmabene@gmail.com>
Sent: Friday, February 13, 2026 10:44 AM
To: D26 FOIA <foia@cary26.org>
Subject: Foia

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Hello

Id like to foia any email or communication to or from Carlos Acosta, McHenry County Rapid Response Team, 855-435-7693, mchenrycorrt@gmail.com. Please send over via email.

Thank you

Jacqueline Garretson

Tuesday, February 17, 2026
Committee of the Whole

To accommodate additional attendees, the meeting will also be held virtually via an expanded Zoom platform. All or a portion of the meeting is being video recorded for purpose of public broadcast.

https://cary26-org.zoom.us/webinar/register/WN__Lbme5kLR5CG9CF6xAAKBw

Committee of the Whole, Music Room, C31 Cary Jr. High School, 2109 Crystal Lake Rd., Cary, IL 60013, 6:00 PM

1. **Organization**
   1.1. Call to Order
   1.2. Roll Call
2. **Acceptance of Agenda**
   Items for discussion may be added to the agenda at the start of the meeting at the request of the Superintendent or any Board Member upon majority approval of those members present.
3. **Community Input**
   Members of the public and District employees may take public comments at this time. Please identify yourself and limit your comments to 3 (three) minutes.
4. **Approval of Previous Meeting Minutes**
   January 20, 2026, Committee of the Whole Minutes
5. **Discussion Topics**
   5.1. Review of Bills
   5.2. Construction Bid Approval for Summer 2026
   5.3. Facility Usage Fees
   Proposed facility usage fees document with changes highlighted. The current document is provided for comparison. This item is for discussion only, although it it could be brought to the regular meeting for approval.
   5.4. Staffing Plan
   5.5. Tech Plan
6. **Closed Session**
   6.1. The appointment, employment, compensation, discipline, performance, or dismissal of specific employee of the public body. 5 ILCS 120/2(c)(1)
7. **Return from Closed Session**
   7.1. No Action Taken
8. **Adjournment**

Cary Community Consolidated School District 26
2115 Crystal Lake Road
Cary, IL 60013

Special Board of Education Meeting Minutes, Monday, January 5, 2026
Generated by Laura Dorfler

1. Organization
Procedural: 1.1 Call to Order
Meeting was called to order at 5:00 p.m. by Mrs. Darling

Procedural: 1.2 Pledge of Allegiance

Procedural: 1.3 Roll Call
Members Present: Bridgette Sanlon, Dee Darling, Kathryn Potter, Julie Jette, Jason Janczak, Mindy Hartman
Members Absent: Stacey Sault

2. Community Input
Procedural: 2.1 Members of the public and District employees may make public comments at this time. Please identify yourself and limit your comments to 3 (three) minutes. No community comment presented.

3. Closed Session
Discussion: 3.1 The appointment, employment, compensation, discipline, performance, or dismissal of specific employees of the public body. 5 ILCS 120/2(c)(1)

Dee Darling asked for a motioned to go into closed session.
Motion Made by Jason Janczak and Seconded by Mindy Hartman
Board Members Present: Dee Darling, Kathryn Potter, Julie Jette, Jason Janczak, Mindy Hartman, Bridgette Sanlon

Discussion: None

Motion Carries

Open Session Ended: 5:02 p.m.
Closed Session Started: 5:02 p.m.
Closed Session Ended: 6:56 p.m.
Open Session Started: 6:56 p.m.

4. Return from Closed Session
Procedural: 4.1 No Action Taken

5. Adjournment

Dee Darling motioned to adjourn the meeting.
Motion Made by Kathryn Potter and Seconded by Bridgette Sanlon
Voice Vote - All in favor - Yes
Meeting adjourned at 6:57 p.m.

Cary Community Consolidated School District 26
2115 Crystal Lake Road
Cary, IL 60013

Special Board of Education Meeting Minutes, Friday, January 9, 2026
Generated by Laura Dorfler

1. Organization
Procedural: 1.1 Call to Order
Meeting was called to order at 5:06 p.m. by Mrs. Darling

Procedural: 1.2 Pledge of Allegiance

Procedural: 1.3 Roll Call
Members Present: Dee Darling, Kathryn Potter, Julie Jette, Jason Janczak, Mindy Hartman, Bridgette Sanlon
Members Absent: Stacey Sault

2. Community Input
Procedural: 2.1 Members of the public and District employees may make public comments at this time. Please identify yourself and limit your comments to 3 (three) minutes. No community comment presented.

3. Closed Session
Discussion: 3.1 The appointment, employment, compensation, discipline, performance, or dismissal of specific employees of the public body. 5 ILCS 120/2(c)(1)

Dee Darling asked for a motioned to go into closed session.
Motion Made by Mindy Hartman and Seconded by Jason Janczak
Board Members Present: Kathryn Potter, Julie Jette, Jason Janczak, Mindy Hartman, Bridgette Sanlon, Dee Darling

Discussion: None

Motion Carries

Open Session Ended: 5:07 p.m.
Closed Session Started: 5:08 p.m.
Closed Session Ended: 8:37 p.m.
Open Session Started: 8:37 p.m.

4. Return from Closed Session
Procedural: 4.1 No Action Taken

5. May I have a motion to reconvene on Saturday, January 10, 2026, at 11:00am

Motion Made by Jason Janczak and Seconded by Kathryn Potter
Discussion: None

Board Members Present: Julie Jette, Jason Janczak, Mindy Hartman, Bridgette Sanlon, Dee Darling, Kathryn Potter

Adjournment
Dee Darling motioned to adjourn the meeting.
Motion Made by Kathryn Potter and Seconded by Bridgette Sanlon
Voice Vote - All in favor - Yes
Meeting adjourned at 8:38 p.m.

Special Board of Education Meeting Minutes, Saturday, January 10, 2026
1. Organization
Procedural: 1.1 Call to Order
Meeting was called to order at 11:03 a.m. by Mrs. Darling

Procedural: 1.2 Pledge of Allegiance

Procedural: 1.3 Roll Call
Members Present: Jason Janczak, Mindy Hartman, Bridgette Sanlon, Dee Darling, Kathryn Potter, Julie Jette
Members Absent: Stacey Sault

2. Community Input
Procedural: 2.1 Members of the public and District employees may make public comments at this time. Please identify yourself and limit your comments to 3 (three) minutes. No community comment presented.

3. Closed Session
Discussion: 3.1 The appointment, employment, compensation, discipline, performance, or dismissal of specific employees of the public body. 5 ILCS 120/2(c)(1)

Dee Darling asked for a motioned to go into closed session.
Motion Made by Bridgette Sanlon and Seconded by Jason Janczak
Board Members Present: Mindy Hartman, Bridgette Sanlon, Dee Darling, Kathryn Potter, Julie Jette, Jason Janczak

Discussion: None
Motion Carries

Open Session Ended: 11:04 a.m.
Closed Session Started: 11:05 a.m.
Closed Session Ended: 2:46 p.m.
Open Session Started: 2:46 p.m.

4. Return from Closed Session

Procedural: 4.1 No Action Taken

Adjournment

Dee Darling motioned to adjourn the meeting.
Motion Made by Bridgette Sanlon and Seconded by Kathryn Potter
Voice Vote - All in favor - Yes
Meeting adjourned at 2:47 p.m.

Cary Community Consolidated School District 26
2115 Crystal Lake Road
Cary, IL 60013

Special Board of Education Meeting Minutes, Monday, January 12, 2026
Generated by Laura Dorfler

1. Organization
Procedural: 1.1 Call to Order
Meeting was called to order at 6:00 p.m. by Mrs. Darling

Procedural: 1.2 Pledge of Allegiance

Procedural: 1.3 Roll Call
Members Present: Bridgette Sanlon, Stacey Sault, Dee Darling, Kathryn Potter, Julie Jette, Jason Janczak, Mindy Hartman
Members Absent: None

2. Community Input
Procedural: 2.1 Members of the public and District employees may make public comments at this time. Please identify yourself and limit your comments to 3 (three) minutes. No community comment presented.

3. Closed Session
Discussion: 3.1 The appointment, employment, compensation, discipline, performance, or dismissal of specific employees of the public body. 5 ILCS 120/2(c)(1)

Dee Darling asked for a motioned to go into closed session.
Motion Made by Mindy Hartman and Seconded by Jason Janczak
Board Members Present: Stacey Sault, Dee Darling, Kathryn Potter, Julie Jette, Jason Janczak, Mindy Hartman, Bridgette Sanlon

Discussion: None

Motion Carries

Open Session Ended: 6:01 p.m.
Closed Session Started: 6:01 p.m.
Closed Session Ended: 6:43 p.m.
Open Session Started: 6:43 p.m.

4. Return from Closed Session
Procedural: 4.1 No Action Taken

5. Adjournment

Dee Darling motioned to adjourn the meeting.

Motion Made by Bridgette Sanlon and Seconded by Kathryn Potter

Voice Vote - All in favor - Yes

Meeting adjourned at 6:43 p.m.

Cary Community Consolidated School District 26
2115 Crystal Lake Road
Cary, IL 60013

Special Board of Education Meeting Minutes, Wednesday, January 21, 2026
Generated by Laura Dorfler

1. Organization
Procedural: 1.1 Call to Order
Meeting was called to order at 5:00 p.m. by Mrs. Darling

Procedural: 1.2 Pledge of Allegiance

Procedural: 1.3 Roll Call
Members Present: Dee Darling, Kathryn Potter, Julie Jette, Jason Janczak, Mindy Hartman, Bridgette Sanlon
Members Absent: Stacey Sault

2. Community Input
Procedural: 2.1 Members of the public and District employees may make public comments at this time. Please identify yourself and limit your comments to 3 (three) minutes. No community comment presented.

3. Closed Session
Discussion: 3.1 The appointment, employment, compensation, discipline, performance, or dismissal of specific employees of the public body. 5 ILCS 120/2(c)(1)

Dee Darling asked for a motioned to go into closed session.
Motion Made by Jason Janczak and Seconded by Bridgette Sanlon
Members Present: Dee Darling, Kathryn Potter, Julie Jette, Jason Janczak, Mindy Hartman, Bridgette Sanlon

Discussion: None

Motion Carries

Open Session Ended: 5:02 p.m.
Closed Session Started: 5:02 p.m.
Closed Session Ended: 8:42 p.m.
Open Session Started: 8:42 p.m.

4. Return from Closed Session
Procedural: 4.1 No Action Taken

5. Adjournment

Dee Darling motioned to adjourn the meeting.

Motion Made by Kathryn Potter and Seconded by Bridgette Sanlon

Voice Vote - All in favor - Yes

Meeting adjourned at 8:43 p.m.

Cary Community Consolidated School District 26
2115 Crystal Lake Road
Cary, IL 60013

Regular Board of Education Meeting Minutes, Monday, January 26, 2026
Generated by Laura Dorfler

1. Organization

1.1 Call to Order
Meeting was called to order at 6:00pm by Mrs. Darling

1.2 Pledge of Allegiance

1.3 Roll Call
Members Present: Stacey Sault, Dee Darling, Julie Jette, Kathryn Potter, Jason Janczak, Mindy Hartman, Bridgette Sanlon
Members Absent: None

2. Community Input

2.1 Briargate Highlight – Mr. Nass introduced Ms. Ressler and Ms. Moscato who discussed Blue Crew and the impact it has on the students. Clara Rauen spoke about how she is helping her peer in school. Danny Wians, Luke Conrad, Isabelle Lawler and Leah Dempsey spoke on designing an Inclusive Playground. The PowerPoint can be found on the agenda.

2.2 Members of the public and District employees may make public comments at this time. Please identify yourself and limit your comments to 3 (three) minutes.
Nancy Schwarz – Congratulations of the groundbreaking at the new transportation department location.

3. Open Forum

There were two FOIA requests this month. The FOIA request can be found on the agenda.

3.1 Board
Mrs. Darling – Thank you Briargate students for coming and speaking tonight. Thank you to all the stakeholders during the New Superintendent search.
Mindy Hartman – Thank you Briargate students for coming and speaking tonight.
Mr. Janczak – Thank you Briargate students for coming and speaking tonight.
Mrs. Jette – Thank you Briargate students for coming and speaking tonight. Thank you to the staff for assisting with the New Superintendent Interviews.
Mrs. Potter – Thank you to Oak Knoll staff for Board Appreciation. Thank you to all the stakeholders during the New Superintendent search. Thank you Briargate students for coming and speaking tonight.
Mrs. Sanlon – Thank you Briargate students for coming and speaking tonight.

Mrs. Sault – Thank you Briargate students for coming and speaking tonight.

4. Superintendent Update

Dr. Thomas updated the Board on:

- Annual 100th Day Food Collection will start in February.
- Cary Jr. High is holding a new logo contest.

5. Teaching & Learning Update

Ms. Rivera updated the Board on:

- 30 Families participated in the book study, Anxious Generations.
- Testing season is underway.
- Thank you D155 for inviting D26 to the Industry Partnership Breakfast.
- Congratulations to Mr. Fitzsimons and his team to receiving the award for Outstanding Implementation within ClassLink.

6. Committee of the Whole Update

Mrs. Darling updated the Board on:

- District AI Plan
- Review of Bills
- Treasurer's Report
- Policy 6:235 Access to Electronic Networks
- School District Calendars 2026-2027 and 2027-2028
- Registration Fees 2026-27
- Oak Knoll Window Abatement Bid

7. Consent Agenda

7.1 December 18, 2025, Regular Board Meeting Minutes

7.2 Closed Session Minutes from December 8th and December 18th Board of Education Meetings

7.3 Monthly Bills and Payroll

7.4 Treasurer's Report

7.5 Resignation/Dismissal/Retirement

7.6 Employment

7.7 Destruction of Closed Meeting Audio Recordings

7.8 Disposal of Assets - None

7.9 School District Calendars 2026-2027 and 2027-2028

7.10 Registration Fees 2026-2027

7.11 Treasurer's Bond

Mrs. Darling asked for a motion to approve the following: 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9, 7.10 and 7.11 as presented.
Motion by Julie Jette and Seconded by Kathryn Potter
Discussion: Mrs. Jette congratulated Mr. Shirley on becoming Principal at Cary Jr. High School. Mrs. Potter requested clarification that the 2027-2028 calendar is tentative and if dates change it will be re-approved at that time.
Voting Yes: Dee Darling, Julie Jette, Kathryn Potter, Jason Janczak, Mindy Hartman, Bridgette Sanlon, Stacey Sault
Voting No: None
Motion Carried

8. Board Discussion and Action

8.1 Approval of Oak Knoll Window Abatement Bid

Mr. Martin reviewed the bid and answered questions from the Board.

Mrs. Darling asked for a motion to approve the Oak Knoll Window Abatement to Husar Abatement in the amount of $66,000 as presented.
Motion by Jason Janczak second by Bridgette Sanlon
Discussion: None
Voting Yes: Julie Jette, Kathryn Potter, Jason Janczak, Mindy Hartman, Bridgette Sanlon, Stacey Sault, Dee Darling
Voting No: None
Motion Carried

9. Topics for Discussion - None

6. Closed Session

6.1 The appointment, employment, compensation, discipline, performance, or dismissal of specific employees of the public body. 5 ILCS 120/2(c)(1)

Dee Darling asked for a motioned to go into closed session.
Motion Made by Mindy Hartman and Seconded by Bridgette Sanlon
Board Members Present: Kathryn Potter, Jason Janczak, Mindy Hartman, Bridgette Sanlon, Stacey Sault, Dee Darling, Julie Jette
Discussion: None
Motion Carries

Open Session Ended: 6:36 p.m.
Closed Session Started: 6:41 p.m.
Closed Session Ended: 7:23 p.m.
Open Session Started: 7:23 p.m.

7. Return from Closed Session

7.1 No Action Taken

10. Adjournment

Mrs. Darling motioned to adjourn the meeting.
Motion made by Mindy Hartman and Seconded by Kathryn Potter
Voice Vote - All in Favor – Yes
Meeting adjourned at 7:24 p.m.

February 23, 2026		
Accounts Payable and Payroll Summary		
Date	Source	Amount
January 5th	Payroll	$654,850.63
January 20th	Payroll	$597,148.45
February	Accounts Payable	$795,810.22
January/February	Imprest	$99,379.18
February	P-Card	$4,369.62
		$2,151,558.10

Invoice Listing

CARY CMTY CONS SCH DIST 26N

Vendor	PO Number	Invoice Number	Batch	Description	Invoice Date	Check Number	Net Amount
4IMPRINT, INC.	0052600000000	14736035	226	PICKLEBALL CAR MAGNETS	02/03/2026	41716	271.88
						Total for 4IMPRINT, INC.:	**271.88**
ACHEY, ALEXANDER		2026 01 30	226	MILEAGE REIMBURSEMENT-JANUARY 2026	01/30/2026	41717	29.58
						Total for ACHEY, ALEXANDER:	**29.58**
ACT NETWORK SOLUTIONS		36460	226A	SHADOW PROTECT DIASTER RECOVERY FEBRUARY 2026	01/23/2026	9000001463	632.00
						Total for ACT NETWORK SOLUTIONS:	**632.00**
ALLIED FACILITY PARTNERS, LLC		APPLICATION 2	226	CARY SOLAR INVOICE 222	12/31/2025	41718	94,500.00
ALLIED FACILITY PARTNERS, LLC		APPLICATION 3	226	CARY SOLAR INVOICE 223	01/31/2026	41718	124,103.29
						Total for ALLIED FACILITY PARTNERS, LLC:	**218,603.29**
ANTHROMED LLC		24244	226	CONTRACTED SLP SERVICES-DP 01/06/2026-01/09/2026	01/15/2026	41719	2,793.32
ANTHROMED LLC		24247	226	CONTRACTED SLP SERVICES-CJH 01/05/2026-01/09/2026	01/15/2026	41719	3,067.40
ANTHROMED LLC		24412	226	SLP SERVICES DP 01/12/2026-01/16/2026	01/22/2026	41719	3,491.65
ANTHROMED LLC		24415	226	SLP SERVICES CJH 01/12/2026-01/16/2026	01/22/2026	41719	3,356.37
ANTHROMED LLC		24578	226	SLP SERVICES DP 01/20/2026-01/22/2026	01/29/2026	41719	2,094.99
ANTHROMED LLC		24581	226	SLP SERVICES CJH 01/20/2026-01/22/2026	01/29/2026	41719	1,978.26
ANTHROMED LLC		24747	226	SLP SERVICES DP 01/26/26-01/30/2026	02/05/2026	41719	3,491.65
ANTHROMED LLC		24750	226	SLP SERVICES CJH 01/26/2026-01/30/2026	02/05/2026	41719	3,378.60
						Total for ANTHROMED LLC:	**23,652.24**
APPLE	0032600000000	MC45204708	226	Sped Ipads for students	01/16/2026	41720	2,398.00
						Total for APPLE:	**2,398.00**
APPLE INC C/O APPLE FINANCIAL SERVICES		595594810	226A	CONTRACT NUMBER 500-50713763	01/29/2026	9000001464	53,071.13
						Total for APPLE INC C/O APPLE FINANCIAL SERVICES:	**53,071.13**
ARCTIC SNOW AND ICE CONTROL, INC		2026011414477-1	226A	Salt Parking Lot w/Road Salt	01/14/2026	9000001465	700.00

Invoice Listing

CARY CMTY CONS SCH DIST 26N

Vendor	PO Number	Invoice Number	Batch	Description	Invoice Date	Check Number	Net Amount
ARCTIC SNOW AND ICE CONTROL, INC		2026011414476-1	226A	SALT PARKING LOT WITH ROAD SALT BG	01/14/2026	9000001466	278.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011514476-1	226A	SALT PARKING LOT WITH ROAD SALT-BG	01/15/2026	9000001467	278.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011514477-1	226A	Salt Parking Lot w/Road Salt-CJH	01/15/2026	9000001468	700.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011414478-1	226A	Salt Parking Lot w/Road Salt-DP	01/14/2026	9000001469	495.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011514478-1	226A	Salt Parking Lot w/Road Salt-DP	01/15/2026	9000001470	495.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011414479-1	226A	Salt Parking Lot w/Road Salt-TRANSPORTATION	01/14/2026	9000001471	290.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011514479-1	226A	Salt Parking Lot w/Road Salt-TRANSPORTATION	01/15/2026	9000001472	290.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011414481-1	226A	Salt Parking Lot w/Road Salt-OK	01/14/2026	9000001473	256.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011514481-1	226A	Salt Parking Lot w/Road Salt-OK	01/15/2026	9000001474	256.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011414480-1	226A	Salt Parking Lot w/Road Salt-TO	01/14/2026	9000001475	399.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011514480-1	226A	Salt Parking Lot w/Road Salt-TO	01/15/2026	9000001476	399.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011614476-2	226A	SALT PARKING LOT-01/16/2026	01/16/2026	9000001477	278.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011614476-1	226A	SALT PARKING LOT-01/16/2026	01/16/2026	9000001478	278.00
ARCTIC SNOW AND ICE CONTROL, INC		2026012014476-1	226A	SALT PARKING LOT-01/19/2026	01/20/2026	9000001479	872.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011914476-1	226A	SALT PARKING LOT-01/18/2026	01/19/2026	9000001480	278.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011814476-1	226A	SALT PARKING LOT-01/17/2026	01/18/2026	9000001481	278.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011614477-1	226A	SALT PARKING LOT CJH-01/16/2026	01/16/2026	9000001482	700.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011614477-2	226A	SALT PARKING LOT CJH-01/16/2026	01/16/2026	9000001483	700.00

Invoice Listing

CARY CMTY CONS SCH DIST 26N

Vendor	PO Number	Invoice Number	Batch	Description	Invoice Date	Check Number	Net Amount
ARCTIC SNOW AND ICE CONTROL, INC		2026011814477-1	226A	SALT PARKING LOT CJH-01/17/2026	01/18/2026	9000001484	700.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011914477-1	226A	SALT PARKING LOT CJH-01/18/2026	01/19/2026	9000001485	700.00
ARCTIC SNOW AND ICE CONTROL, INC		2026012014477-1	226A	SALT PARKING LOT CJH-01/19/2026	01/20/2026	9000001486	2,100.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011614478-2	226A	SALT PARKING LOT DP-01/16/2026	01/16/2026	9000001487	495.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011614478-1	226A	SALT PARKING LOT DP-01/16/2026	01/16/2026	9000001488	495.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011814478-1	226A	SALT PARKING LOT DP-01/17/2026	01/18/2026	9000001489	495.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011914478-1	226A	SALT PARKING LOT DP-01/18/2026	01/19/2026	9000001490	495.00
ARCTIC SNOW AND ICE CONTROL, INC		2026012014478-1	226A	SALT PARKING LOT DP-01/19/2026	01/20/2026	9000001491	1,495.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011614481-1	226A	SALT PARKING LOT OK-01/16/2026	01/16/2026	9000001492	256.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011614481-2	226A	SALT PARKING LOT OK-01/16/2026	01/16/2026	9000001493	256.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011814481-1	226A	SALT PARKING LOT OK-01/17/2026	01/18/2026	9000001494	256.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011914481-1	226A	SALT PARKING LOT OK-01/18/2026	01/19/2026	9000001495	256.00
ARCTIC SNOW AND ICE CONTROL, INC		2026012014481-1	226A	SALT PARKING LOT OK-01/19/2026	01/20/2026	9000001496	876.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011614480-1	226A	SALT PARKING LOT TO-01/16/2026	01/16/2026	9000001497	399.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011614480-2	226A	SALT PARKING LOT TO-01/16/2026	01/16/2026	9000001498	399.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011814480-1	226A	SALT PARKING LOT TO-01/17/2026	01/18/2026	9000001499	399.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011914480-1	226A	SALT PARKING LOT TO-01/18/2026	01/18/2026	9000001500	399.00
ARCTIC SNOW AND ICE CONTROL, INC		2026012014480-1	226A	SALT PARKING LOT TO-01/19/2026	01/20/2026	9000001501	1,353.00

Invoice Listing

CARY CMTY CONS SCH DIST 26N

Vendor	PO Number	Invoice Number	Batch	Description	Invoice Date	Check Number	Net Amount
ARCTIC SNOW AND ICE CONTROL, INC		2026011614479-1	226A	SALT PARKING LOT TRANSPORTATION-01/16/2026	01/16/2026	9000001502	290.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011614479-2	226A	SALT PARKING LOT TRANSPORTATION-01/16/2026	01/16/2026	9000001503	290.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011814479-1	226A	SALT PARKING LOT TRANSPORTATION-01/17/2026	01/18/2026	9000001504	290.00
ARCTIC SNOW AND ICE CONTROL, INC		2026011914479-1	226A	SALT PARKING LOT TRANSPORTATION-01/18/2026	01/19/2026	9000001505	290.00
ARCTIC SNOW AND ICE CONTROL, INC		2026012014479-1	226A	SALT PARKING LOT TRANSPORTATION-01/19/2026	01/20/2026	9000001506	868.00
ARCTIC SNOW AND ICE CONTROL, INC		2026012114477-1	226A	SALT PARKING LOT-CJH 01/21/2026	01/21/2026	9000001507	700.00
ARCTIC SNOW AND ICE CONTROL, INC		2026012714477-1	226A	SALT PARKING LOT-CJH 01/25/2026	01/27/2026	9000001508	700.00
ARCTIC SNOW AND ICE CONTROL, INC		202612814477-1	226A	SALT PARKING LOT-CJH 01/25/2026	01/28/2026	9000001509	700.00
ARCTIC SNOW AND ICE CONTROL, INC		2026012114480-1	226A	SALT PARKING LOT-TO 01/21/2026	01/21/2026	9000001510	399.00
ARCTIC SNOW AND ICE CONTROL, INC		2026012714480-1	226A	SALT PARKING LOT-TO 01/25/2026	01/27/2026	9000001511	399.00
ARCTIC SNOW AND ICE CONTROL, INC		2026012814480-1	226A	SALT PARKING LOT-TO 01/25/2026	01/28/2026	9000001512	399.00
ARCTIC SNOW AND ICE CONTROL, INC		2026012114481-1	226A	SALT PARKING LOT-OK 01/21/2026	01/21/2026	9000001513	256.00
ARCTIC SNOW AND ICE CONTROL, INC		2026012714481-1	226A	SALT PARKING LOT-OK 01/25/2026	01/27/2026	9000001514	256.00
ARCTIC SNOW AND ICE CONTROL, INC		2026012814481-1	226A	SALT PARKING LOT-OK 01/25/2026	01/28/2026	9000001515	256.00
ARCTIC SNOW AND ICE CONTROL, INC		2026012114476-1	226A	SALT PARKING LOT-BG 01/21/2026	01/21/2026	9000001516	278.00
ARCTIC SNOW AND ICE CONTROL, INC		2026012714476-1	226A	SALT PARKING LOT-BG 01/25/2026	01/27/2026	9000001517	278.00
ARCTIC SNOW AND ICE CONTROL, INC		2026012814476-1	226A	SALT PARKING LOT-BG 01/25/2026	01/28/2026	9000001518	278.00
ARCTIC SNOW AND ICE CONTROL, INC		2026012114479-1	226A	SALT PARKING LOT-TRANSPORTATION 01/21/2026	01/21/2026	9000001519	290.00

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ARCTIC SNOW AND ICE CONTROL, INC		2026012714479-1	226A	SALT PARKING LOT-TRANSPORTATION 01/25/2026	01/27/2026	9000001520	290.00
ARCTIC SNOW AND ICE CONTROL, INC		2026012814479-1	226A	SALT PARKING LOT-TRANSPORTATION 01/25/2026	01/28/2026	9000001521	290.00
ARCTIC SNOW AND ICE CONTROL, INC		202612114478-1	226A	SALT PARKING LOT-DP 01/21/2026	01/21/2026	9000001522	495.00
ARCTIC SNOW AND ICE CONTROL, INC		2026012714478-1	226A	SALT PARKING LOT-DP 01/25/2026	01/21/2026	9000001523	495.00
ARCTIC SNOW AND ICE CONTROL, INC		2026012814478-1	226A	SALT PARKING LOT-DP 01/25/2026	01/28/2026	9000001524	495.00
ARCTIC SNOW AND ICE CONTROL, INC		2026020214477-1	226A	SALT PARKING LOT-CJH 01/30/2026	02/02/2026	9000001525	700.00
ARCTIC SNOW AND ICE CONTROL, INC		2026020214476-1	226A	SALT PARKING LOT-BG 01/30/2026	02/02/2026	9000001526	278.00
ARCTIC SNOW AND ICE CONTROL, INC		2026020214481-1	226A	SALT PARKING LOT-OK 01/30/2026	02/02/2026	9000001527	256.00
ARCTIC SNOW AND ICE CONTROL, INC		2026020214479-1	226A	SALT PARKING LOT-TRANSPORTATION 01/30/2026	02/02/2026	9000001528	290.00
ARCTIC SNOW AND ICE CONTROL, INC		2026020214480-1	226A	SALT PARKING LOT-TO 01/30/2026	02/02/2026	9000001529	399.00
ARCTIC SNOW AND ICE CONTROL, INC		2026020214478-1	226A	SALT PARKING LOT-DP 01/30/2026	02/02/2026	9000001530	495.00
ARCTIC SNOW AND ICE CONTROL, INC		2026020514476-1	226A	SALT PARKING LOT-BG-02/02/2026	02/05/2026	9000001531	278.00
ARCTIC SNOW AND ICE CONTROL, INC		2026020614476-1	226A	SALT PARKING LOT-BG-02/06/2026	02/06/2026	9000001532	278.00
ARCTIC SNOW AND ICE CONTROL, INC		2026020514479-1	226A	SALT PARKING LOT-TRANSPORTATION 02/02/2026	02/10/2026	9000001533	290.00
ARCTIC SNOW AND ICE CONTROL, INC		2026020514477-1	226A	SALT PARKING LOT-CJH 02/02/2026	02/05/2026	9000001534	700.00
ARCTIC SNOW AND ICE CONTROL, INC		2026020614477-1	226A	SALT PARKING LOT-CJH 02/06/2026	02/06/2026	9000001535	700.00
ARCTIC SNOW AND ICE CONTROL, INC		2026020514478-1	226A	SALT PARKING LOT-DP 02/02/2026	02/05/2026	9000001536	495.00
ARCTIC SNOW AND ICE CONTROL, INC		2026020614478-1	226A	SALT PARKING LOT-DP 02/06/2026	02/06/2026	9000001537	495.00

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Vendor	PO Number	Invoice Number	Batch	Description	Invoice Date	Check Number	Net Amount
ARCTIC SNOW AND ICE CONTROL, INC		2026020514481-1	226A	SALT PARKING LOT-OK 02/02/2026	02/05/2026	9000001538	256.00
ARCTIC SNOW AND ICE CONTROL, INC		2026020614481-1	226A	SALT PARKING LOT-OK 02/06/2026	02/06/2026	9000001539	256.00
ARCTIC SNOW AND ICE CONTROL, INC		2026020514480-1	226A	SALT PARKING LOT-TO 02/02/2026	02/05/2026	9000001540	399.00
ARCTIC SNOW AND ICE CONTROL, INC		2026020614480-1	226A	SALT PARKING LOT-TO 02/06/2026	02/06/2026	9000001541	399.00
ARCTIC SNOW AND ICE CONTROL, INC		2026020614480-1	226A	SALT PARKING LOT-TRANSPORTATION 02/06/2026	02/10/2026	9000001542	290.00
					Total for ARCTIC SNOW AND ICE CONTROL, INC:		**36,580.00**
AUTOZONE		02771748295	226	STOP/TURN/TAIL Eiko 10 Pack Bulbs	01/26/2026	41721	15.17
AUTOZONE		02771748298	226	STP 80W90 G STP 80W-90 Gear Oil	01/26/2026	41721	21.76
AUTOZONE		02771748922	226	CABIN FILTER STP CABIN AIR FILTER	01/28/2026	41721	38.56
AUTOZONE		02771748923	226	EXHAUST SYSTEM SE JB	01/28/2026	41721	170.91
AUTOZONE		02771748924	226	2 1/2 SS FLAT BA	01/28/2026	41721	13.29
AUTOZONE		02771748957	226	TAILPIPE EXPANDER OEM	01/28/2026	41721	45.00
AUTOZONE		02771749495	226	COMMERICAL 10PK MIN EIKO BULBS	01/30/2026	41721	8.78
					Total for AUTOZONE:		**313.47**
BENNYS SERVICE CENTER INC.		7053	226	SAFETY INSPECTIONS	01/02/2026	41722	108.00
BENNYS SERVICE CENTER INC.		7129	226	SAFETY INSPECTIONS	02/10/2026	41722	753.00
					Total for BENNYS SERVICE CENTER INC.:		**861.00**
BLANCO, JENNIFER L		2025 12 18	226	REIMBURSEMENT-ART SUPPLIES	12/18/2025	41723	401.62
					Total for BLANCO, JENNIFER L:		**401.62**
BLU PETROLEUM INC		SI-37684	226A	REFORMULATED NL GASOHOL	01/08/2026	9000001543	15,168.85
BLU PETROLEUM INC		SI-40202	226A	TEC-GUARD ARMOR SYN BLD 5W30 PCMO DRUM	02/09/2026	9000001543	526.92
					Total for BLU PETROLEUM INC:		**15,695.77**
BOLLER CONSTRUCTION COMPANY INC		APPLICATION 4	226	CARY 26 NEW TRANSPORTATION FACILITY	01/31/2026	41724	72,476.00
					Total for BOLLER CONSTRUCTION COMPANY INC:		**72,476.00**

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BORNEKOMOSA, JENNIFER		2026 01 30	226A	VISION ITINERANT JANUARY 2026	01/30/2026	9000001544	7,200.00
BORNEKOMOSA, JENNIFER		2026 02 03 MILEAGE	226A	MILEAGE REIMBURSEMENT JANUARY 2026	02/03/2026	9000001544	9.86
						Total for BORNEKOMOSA, JENNIFER:	**7,209.86**
BRAXY SPEECH THERAPY PLLC		2524	226A	CONTRACTED SLP 01/01/2026-01/15/2026	01/16/2026	9000001545	7,245.00
BRAXY SPEECH THERAPY PLLC		2526	226A	SLP SERVICES 01/16/2026-01/31/2026	02/03/2026	9000001545	7,245.00
						Total for BRAXY SPEECH THERAPY PLLC:	**14,490.00**
CARRIE, ZOE		2026 01 30	226A	MILEAGE REIMBURSEMENT JANUARY 2026	01/30/2026	9000001546	20.30
						Total for CARRIE, ZOE:	**20.30**
CARY GROVE COMPUTERS	0042600000000	8028	226A	iPad Repairs	01/12/2026	9000001547	3,395.00
						Total for CARY GROVE COMPUTERS:	**3,395.00**
CHICAGO METROPOLITAN FIRE PREVENTION CO.		IN00476160	226A	F/A AL Radio Use/Maintenance 01/01/26-03/31/26	01/01/2026	9000001548	90.75
CHICAGO METROPOLITAN FIRE PREVENTION CO.		IN00476161	226A	F/A AL Radio Use/Maintenance 01/01/26-03/31/26	01/01/2026	9000001548	90.75
CHICAGO METROPOLITAN FIRE PREVENTION CO.		IN00476162	226A	F/A AL Radio Use/Maintenance 01/01/26-03/31/26	01/01/2026	9000001548	90.75
CHICAGO METROPOLITAN FIRE PREVENTION CO.		IN00476163	226A	F/A AL Radio Use/Maintenance 01/01/2-03/31/26	01/01/2026	9000001548	90.75
CHICAGO METROPOLITAN FIRE PREVENTION CO.		IN00476164	226A	F/A AL Radio Use/Maintenance 01/01/26-03/31/26	01/01/2026	9000001548	90.75
CHICAGO METROPOLITAN FIRE PREVENTION CO.		IN00476165	226A	F/A AL Radio Use/Maintenance 01/01/26-03/31/26	01/22/2026	9000001548	90.75
CHICAGO METROPOLITAN FIRE PREVENTION CO.		IN00476166	226A	F/A AL Radio Use/Maintenance 01/01/26-03/31/26	01/01/2026	9000001548	90.75
						Total for CHICAGO METROPOLITAN FIRE PREVENTION CO.:	**635.25**

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CINTAS CORPORATION NO. 2		4256799669	226	TRANSPORTATION	01/19/2026	41725	35.00
CINTAS CORPORATION NO. 2		4257448967	226	3X5 XTRAC MAT ONYX	01/26/2026	41725	59.53
CINTAS CORPORATION NO. 2		4258205650	226	SHIRT/M/WORKSHIRT/NAVY/SS - SZ PREM-RG2XL	02/02/2026	41725	35.00
CINTAS CORPORATION NO. 2		4258949291	226	3X5 XTRAC MAT ONYX	02/09/2026	41725	59.53
						Total for CINTAS CORPORATION NO. 2:	**189.06**
CITYWIDE BUILDING MAINTENANCE INC		56038	226A	Weekend Event Porter Service DP 01/10/2026-01/11/2026	01/16/2026	9000001549	1,237.50
CITYWIDE BUILDING MAINTENANCE INC		56045	226A	PORTER SERVICE-CBA WEEKEND GYM USE DP-01/17/2026	01/19/2026	9000001549	1,181.25
CITYWIDE BUILDING MAINTENANCE INC		56056	226A	SNOW REMOVAL	01/21/2026	9000001549	797.50
CITYWIDE BUILDING MAINTENANCE INC		56068	226A	SNOW REMOVAL-01/21/2026	01/22/2026	9000001549	605.00
CITYWIDE BUILDING MAINTENANCE INC		56096	226A	PORTER SERVICE CBA WEEKEND 01/24/2026-01/25/2026	01/29/2026	9000001549	1,378.13
CITYWIDE BUILDING MAINTENANCE INC		56108	226A	CBA WEEKEND PORTER SERVICE 01/31/2026-02/01/2026	02/02/2026	9000001549	1,425.00
CITYWIDE BUILDING MAINTENANCE INC		56263	226A	JANITORIAL SERVICES FEBRUARY 2026	02/01/2026	9000001549	66,350.66
CITYWIDE BUILDING MAINTENANCE INC		56298	226A	SNOW REMOVAL 01/22/2026-02/02/2026	02/03/2026	9000001549	783.75
CITYWIDE BUILDING MAINTENANCE INC		56322	226A	CBA WEEKEND 02/07/2026-02/08/2026	02/03/2026	9000001549	1,256.25
						Total for CITYWIDE BUILDING MAINTENANCE INC:	**75,015.04**
COMMUNITY MECHANICAL AND AUTOMATION LLC		3604	226A	BOILER JANUARY 2026 SERVICE CALLS	02/03/2026	9000001550	4,201.00
COMMUNITY MECHANICAL AND AUTOMATION LLC		3605	226A	JANUARY 2026 KITCHEN SERVICE CALLS	02/03/2026	9000001550	1,040.00
COMMUNITY MECHANICAL AND AUTOMATION LLC		3606	226A	JANUARY 2026 SERVICE CALLS	02/03/2026	9000001550	800.00

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COMMUNITY MECHANICAL AND AUTOMATION LLC		3607	226A	JANUARY 2026 SERVICE CALLS	02/03/2026	9000001550	400.00
COMMUNITY MECHANICAL AND AUTOMATION LLC		3608	226A	JANUARY 2026 SERVICE CALLS	02/03/2026	9000001550	880.00
				Total for COMMUNITY MECHANICAL AND AUTOMATION LLC:			**7,321.00**
CONNECTIONS DAY SCHOOL		34114	226	TUITION JANUARY 2026	01/30/2026	41726	6,060.60
CONNECTIONS DAY SCHOOL		34116	226	TUITION JANUARY 2026	01/30/2026	41726	6,955.74
CONNECTIONS DAY SCHOOL		34117	226	TUITION JANUARY 2026	01/30/2026	41726	6,060.60
CONNECTIONS DAY SCHOOL		34198	226	PSYCHOLOGICAL EVAL	02/09/2026	41726	1,050.00
				Total for CONNECTIONS DAY SCHOOL:			**20,126.94**
DORFLER, LAURA		2026 01 29	226	REIMBURSEMENT-SUPERBOWL TABLECLOTHS	01/29/2026	41727	26.33
				Total for DORFLER, LAURA:			**26.33**
EVERWAY HOLDCO, LLC	0032600000000	00276778N	226A	INTERACTIVE WEBINAR 1 HR	01/28/2026	9000001551	399.00
				Total for EVERWAY HOLDCO, LLC:			**399.00**
FIRST CALL		2445-145550	226	BUSHING	01/26/2026	41728	23.22
				Total for FIRST CALL:			**23.22**
FOLLETT CONTENT SOLUTIONS LLC	0002600000000	674785	226	Library Books	01/06/2026	41729	741.71
FOLLETT CONTENT SOLUTIONS LLC	0002600000000	674785F	226	Library Books	01/27/2026	41729	329.11
				Total for FOLLETT CONTENT SOLUTIONS LLC:			**1,070.82**
FOX RIVER GLASS & MIRROR INC		18494	226	GLASS REPLACED IN CAFETERIA	01/19/2026	41730	280.00
				Total for FOX RIVER GLASS & MIRROR INC:			**280.00**
FSS TECHNOLOGIES LLC		I-84667	226A	Burglar Alarm - Central Station Monitoring 02/01/2026 to 04/30/2026	01/17/2026	9000001552	726.00
FSS TECHNOLOGIES LLC		I-85772	226A	UPGRADE BURGLAR ALARM	01/26/2026	9000001552	1,610.00
				Total for FSS TECHNOLOGIES LLC:			**2,336.00**

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GFC LEASING-WI		I01092951	226	COPIER MAINTENANCE/LEASE	01/27/2026	41731	4,965.65
						Total for GFC LEASING-WI:	**4,965.65**
GFL ENVIRONMENTAL SERIVCES USA LLC		LQ03223457	226A	Disposal: 55-Gallon Drum - Propylene Glycol - 122925DPES-SW-O1	01/14/2026	9000001553	1,136.50
						Total for GFL ENVIRONMENTAL SERIVCES USA LLC:	**1,136.50**
GORDON FLESCH COMPANY, INC.		IN15464514	226	STAPLE CARTRIDGE Y1-BG	01/23/2026	41732	104.00
GORDON FLESCH COMPANY, INC.		IN15467091	226	STAPLE-P1 BG	01/25/2026	41732	196.00
GORDON FLESCH COMPANY, INC.		IN15470989	226	TONER, PAPER, & PRINTER SUPPLIES-BG	01/18/2026	41732	85.59
GORDON FLESCH COMPANY, INC.		IN15475613	226	TONER, PAPER, & PRINTER SUPPLIES	01/21/2026	41732	4,272.89
GORDON FLESCH COMPANY, INC.		IN15485781	226	STAPLE-P1 CJH	01/30/2026	41732	384.00
						Total for GORDON FLESCH COMPANY, INC.:	**5,042.48**
H.R. STEWART, INC		32290	226A	FAILED MANHOLE	01/21/2026	9000001554	1,285.00
H.R. STEWART, INC		33549	226A	LEAK REPAIR CJH	01/21/2026	9000001554	1,200.61
						Total for H.R. STEWART, INC:	**2,485.61**
HEARTLAND ALLIANCE HEALTH CCIS		27830	226A	INTERPRETING SERVICES12/05/2025-12/19/2025	12/31/2025	9000001555	1,165.61
						Total for HEARTLAND ALLIANCE HEALTH CCIS:	**1,165.61**
HENDERSHOT, JANET		2026 01 30	226A	MILEAGE REIMBURSEMENT-JANUARY 2026	01/30/2026	9000001556	6.96
						Total for HENDERSHOT, JANET:	**6.96**
HODGES LOIZZI EISENHAMMER		68142	226A	LEGAL SERVICES NOVEMBER 2025	12/31/2025	9000001557	1,337.10
						Total for HODGES LOIZZI EISENHAMMER:	**1,337.10**
HOH WATER TECHNOLOGY, INC.		718039	226A	JANUARY 2026 MONTHLY WATER TREATMENT	01/08/2026	9000001558	747.34
HOH WATER TECHNOLOGY, INC.		720222	226A	FEBRUARY 2026 MONTHLY WATER AGREEMENT	02/09/2026	9000001558	747.34
						Total for HOH WATER TECHNOLOGY, INC.:	**1,494.68**

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HOIKA LIPKIE, CHERYL		1104	226A	BILINGUAL SPEECH LANGUAGE PLAY BASED ASSESSMENT	01/30/2026	9000001559	390.00
						Total for HOIKA LIPKIE, CHERYL:	**390.00**
HYA CORPORATION		H3411	226A	EXECUTIVE DUE DILIGENCE REPORT	01/30/2026	9000001560	3,300.00
						Total for HYA CORPORATION:	**3,300.00**
INTEGRATED SYSTEMS CORPORATION		1772	226A	SKYWARD HOSTING SERVICES FINANCE	02/01/2026	9000001561	3,000.00
						Total for INTEGRATED SYSTEMS CORPORATION:	**3,000.00**
J.W. CHICAGO		34573	226	TRANSPORTATION SERVICES-01/05/2026-01/16/2026	01/16/2026	41733	18,100.00
J.W. CHICAGO		34593	226	TRANSPORTATION SERVICES	01/30/2026	41733	16,830.00
						Total for J.W. CHICAGO:	**34,930.00**
J.W. PEPPER & SON INC.	1252600000000	368262169	226A	Band supplies-Bross	02/04/2026	9000001562	542.99
						Total for J.W. PEPPER & SON INC.:	**542.99**
JOHNSON CONTROLS BUILDING SOLUTIONS LLC		00049044379	226A	SD 26 SERVER UPGRADE	02/05/2026	9000001563	8,756.00
						Total for JOHNSON CONTROLS BUILDING SOLUTIONS LLC:	**8,756.00**
JOSTENS		38476620	226	FULFILLMENT FACSIMILE SIGNATURE	01/14/2026	41734	13.05
JOSTENS	1252600000000	38362390	226	Diploma covers Invoice attached. Items received, please pay now. ad	12/30/2025	41734	1,098.20
JOSTENS	1252600000000	38215735	226	Diploma cover envelopes. Invoice attached, please pay now. Items received. ad	12/08/2025	41734	196.70
						Total for JOSTENS:	**1,307.95**
LANGUAGE LINE SERVICES		11832949	226	OVER THE PHONE INTERPRETATION	01/31/2026	41735	119.11
						Total for LANGUAGE LINE SERVICES:	**119.11**
LEACH ENTERPRISES INC.		01P26210	226A	ADAPTER 1F X 3/4M	01/28/2026	9000001564	100.97
LEACH ENTERPRISES INC.		01P26267	226A	AXLE NUT SKT 2-1/4 6 POINT	01/28/2026	9000001564	45.15
						Total for LEACH ENTERPRISES INC.:	**146.12**

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LEARNWELL		INV290132	226	HOMEBOUND TUTORING-01/06/2026-01/08/2026	01/09/2026	41736	192.00
LEARNWELL		INV290134	226	HOMEBOUND TUTORING-01/06/2026-01/09/2026	01/09/2026	41736	384.00
LEARNWELL		INV291764	226	HOMEBOUND TUTORING 01/12/2026-01/15/2026	01/16/2026	41736	192.00
LEARNWELL		INV291765	226	HOMEBOUND TUTORING 01/12/2026-01/16/2026	01/16/2026	41736	320.00
LEARNWELL		INV291766	226	HOMEBOUND TUTORING 01/13/2026-01/16/2026	01/16/2026	41736	448.00
LEARNWELL		INV291767	226	HOMEBOUND TUTORING 01/15/2026	01/16/2026	41736	96.00
LEARNWELL		INV292716	226	HOMEBOUND TUTORING 01/22/2026	01/23/2026	41736	64.00
LEARNWELL		INV292717	226	HOMEBOUND TUTORING 01/20/2026-01/22/2026	01/23/2026	41736	192.00
LEARNWELL		INV292718	226	HOMEBOUND TUTORING 01/20/2026-01/22/2026	01/23/2026	41736	384.00
LEARNWELL		INV292719	226	HOMEBOUND TUTORING 01/22/2026	01/23/2026	41736	96.00
LEARNWELL		INV294100	226	HOSPITAL TUTORING 01/26/2026-01/30/2026	01/30/2026	41736	320.00
LEARNWELL		INV294102	226	HOSPITAL TUTORING 01/26/2026-01/30/2026	01/30/2026	41736	576.00
						Total for LEARNWELL:	**3,264.00**
MANTHEY, DENISE N.		2026 02 01	226	CONTRACTED SCHOOL PSYCHOLOGIST	02/01/2026	41737	11,835.00
						Total for MANTHEY, DENISE N.:	**11,835.00**
MARTIN, DAVID		2026 02 03	226A	MILEAGE REIMBURSEMENT JANUARY 2026	02/03/2026	9000001565	88.45
						Total for MARTIN, DAVID:	**88.45**
MCHENRY COUNTY REGIONAL		BRS-0341	226	BUS DRIVER EDUCATION-REFRESHER COLLEEN LEIBFORTH	01/27/2026	41738	10.00
						Total for MCHENRY COUNTY REGIONAL:	**10.00**
MENARD INC		47906	226A	DURACELL ALK AA - 24PK	01/05/2026	9000001566	53.94
MENARD INC		48119	226A	SATIN NICK FINISH DBL HK	01/08/2026	9000001566	4.93
MENARD INC		48419	226A	FLEX SEAL MAX	01/14/2026	9000001566	27.17
MENARD INC		48420	226A	24TPI BIMETAL BLADE 10PK	01/14/2026	9000001566	33.98

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Vendor	PO Number	Invoice Number	Batch	Description	Invoice Date	Check Number	Net Amount
MENARD INC		48752	226A	20LB WH PIC HANGING VP	01/20/2026	9000001566	51.99
MENARD INC		48832	226A	ZINC Y CONNECT SHUT OFF	01/21/2026	9000001566	13.49
MENARD INC		49352	226A	LID FOR 3.5/5G BUCKET	01/30/2026	9000001566	26.43
MENARD INC		49353	226A	LID FOR 3.5/5G BUCKET	01/30/2026	9000001566	26.43
MENARD INC		49354	226A	LID FOR 3.5/5G BUCKET	01/30/2026	9000001566	26.43
MENARD INC		49355	226A	LID FOR 3.5/5G BUCKET	01/30/2026	9000001566	26.43
MENARD INC		49356	226A	LID FOR 3.5/5G BUCKET	01/30/2026	9000001566	24.45
						Total for MENARD INC:	**315.67**
MIDWEST TRANSIT EQUIPMENT INC.		X106053402:01	226A	PADS, BRAKE, 70MM, QUAD	01/16/2026	9000001567	252.00
MIDWEST TRANSIT EQUIPMENT INC.		X106053419:01	226A	1" HEAVY DUTY IMPACT W/EXTEND	01/21/2026	9000001567	1,242.35
MIDWEST TRANSIT EQUIPMENT INC.		X106053427:01	226A	BLOWER ASSY, STEPWELL	01/23/2026	9000001567	249.00
MIDWEST TRANSIT EQUIPMENT INC.		X106053513:01	226A	HARDWARE, BRAKE QUAD CALIPER	01/23/2026	9000001567	205.06
MIDWEST TRANSIT EQUIPMENT INC.		X106053513:02	226A	BLADE, WIPER, 20" WINTER	02/06/2026	9000001567	61.80
MIDWEST TRANSIT EQUIPMENT INC.		X106053629:01	226A	BLOWER ASSY, STEPWELL	01/29/2026	9000001567	100.00
MIDWEST TRANSIT EQUIPMENT INC.		X106053727:01	226A	SENSOR, COOLANT TEMP	02/06/2026	9000001567	473.98
MIDWEST TRANSIT EQUIPMENT INC.		X106053764 01	226A	HANDLE,PARK BRK RELEASE	02/09/2026	9000001567	95.92
						Total for MIDWEST TRANSIT EQUIPMENT INC.:	**2,680.11**
MOSCATO, MELANIE		2026 02 02	226A	MILEAGE REIMBURSEMENT JANUARY 2026	02/02/2026	9000001568	13.20
						Total for MOSCATO, MELANIE:	**13.20**
NELBUD SERVICES, LLC		45559123	226A	KITCHEN FIRE SUPPRESSION INSPECTION	01/14/2026	9000001569	145.00
						Total for NELBUD SERVICES, LLC:	**145.00**
NETRIX LLC		DI-008219	226A	NU EMERGENCY RESPONDER ADD ON	02/03/2026	9000001570	3,320.00
						Total for NETRIX LLC:	**3,320.00**

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Vendor	PO Number	Invoice Number	Batch	Description	Invoice Date	Check Number	Net Amount
NEW CONNECTIONS ACADEMY		17275	226	TUITION JANUARY 2026	01/30/2026	41739	6,674.04
						Total for NEW CONNECTIONS ACADEMY:	**6,674.04**
NORTH AMERICAN CORP OF ILLINOIS LLC	0072600000000	E381231	226	Custodial Supplies Email to: tanselm@na.com	01/16/2026	41740	416.84
NORTH AMERICAN CORP OF ILLINOIS LLC	0072600000000	E387475	226	Custodial Supplies Email to: tanselm@na.com	01/22/2026	41740	29.06
NORTH AMERICAN CORP OF ILLINOIS LLC	0072600000000	E389594	226	Custodial Supplies Email to: tanselm@na.com	01/23/2026	41740	196.56
						Total for NORTH AMERICAN CORP OF ILLINOIS LLC:	**642.46**
OIL EQUIPMENT CO. INC		0377979-IN	226A	JANUARY 2026 MONTHLY AB INSPECTION	01/30/2026	9000001571	225.00
						Total for OIL EQUIPMENT CO. INC:	**225.00**
OPTUM		0001869135	226	FSA-JAN 26-MINIMUM	02/06/2026	41741	150.00
OPTUM		1854430	226	HSA MONTHLY MAINTENANCE FEE DECEMBER 2025	01/12/2026	41741	8.25
OPTUM		1855612	226	FSA-25 DEC MINIMUM	01/14/2026	41741	150.00
						Total for OPTUM:	**308.25**
PAHCS II/NORTHWESTERN MEDICINE		569131	226A	DRUG SCREEN-ESCREEN RAPID CUP	12/31/2025	9000001572	162.00
PAHCS II/NORTHWESTERN MEDICINE		569139	226A	DRUG SCREEN-ESCREEN RAPID CUP	12/31/2025	9000001572	162.00
PAHCS II/NORTHWESTERN MEDICINE		569618	226A	DRUG SCREEN-DOT PANEL	12/31/2025	9000001572	470.00
PAHCS II/NORTHWESTERN MEDICINE		569835	226A	DRUG SCREEN-ESCREEN RAPID CUP	12/31/2025	9000001572	324.00
						Total for PAHCS II/NORTHWESTERN MEDICINE:	**1,118.00**

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Vendor	PO Number	Invoice Number	Batch	Description	Invoice Date	Check Number	Net Amount
PARKLAND PREPARATORY ACADEMY INC		7452	226	TUITION JANUARY 2026	01/30/2026	41742	5,593.98
						Total for PARKLAND PREPARATORY ACADEMY INC:	**5,593.98**
PEEWEE SPEECH THERAPY PLLC		PST-000014	226A	SPEECH LANGUAGE SERVICES	01/08/2026	9000001573	11,172.00
						Total for PEEWEE SPEECH THERAPY PLLC:	**11,172.00**
PETERSON, SUSAN		2026 01 30	226A	MILEAGE REIMBURSEMENT-JANUARY 2026	01/30/2026	9000001574	209.53
						Total for PETERSON, SUSAN:	**209.53**
PODGORSKI, SARAH		2026 01 26	226	REIMBURSEMENT-SUPPLIES	01/29/2026	41743	75.00
						Total for PODGORSKI, SARAH:	**75.00**
POMEROY, LAUREN		2026 01 26	226	JANUARY 2026 MILEAGE REIMBURSEMENT	01/26/2026	41744	9.14
						Total for POMEROY, LAUREN:	**9.14**
PROCARE THERAPY		21356329	226A	CONTRACTED SERVICES-SCHOOL SLP	01/11/2026	9000001575	7,046.50
PROCARE THERAPY		21361653	226A	CONTRACTED SERVICES 01/12/2026-01/16/2026	01/18/2026	9000001575	7,974.48
PROCARE THERAPY		21367158	226A	CONTRACTED SERVICES 1/20/2026-01/22/2026	01/25/2026	9000001575	4,894.47
PROCARE THERAPY		21373496	226A	CONTRACTED SERVICES 01/26/2026-01/30/2026	02/01/2026	9000001575	8,009.97
						Total for PROCARE THERAPY:	**27,925.42**
QUALLS, KIM		2026 01 13	226	REIMBURSEMENT-XMAS RAFFLE/LUNCH	01/13/2026	41745	341.04
QUALLS, KIM		2026 01 21	226	REIMBURSEMENT-PIZZA FOR INTERVIEW STAFF	01/21/2026	41745	84.65
QUALLS, KIM		2026 01 21A	226	REIMBURSEMENT-PARTY SUPPLIES FOR STAFF	01/21/2026	41745	55.25
						Total for QUALLS, KIM:	**480.94**
ROOTS AUTISM SOLUTIONS		13007832	226A	D26 REPORTS, TEAM MEETINGS OBSERVATIONS JANUARY 2026	02/16/2026	41714	2,257.50
						Total for ROOTS AUTISM SOLUTIONS:	**2,257.50**
ROSCOE		1922153	226A	CUSTODIAL SUPPLIES	01/15/2026	9000001576	168.04
ROSCOE		1922154	226A	CUSTODIAL SUPPLIES	01/15/2026	9000001576	191.29
ROSCOE		1922997	226A	CUSTODIAL SUPPLIES-CJH	01/22/2026	9000001576	335.10

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Vendor	PO Number	Invoice Number	Batch	Description	Invoice Date	Check Number	Net Amount
ROSCOE		1922998	226A	CUSTODIAL SUPPLIES-DP	01/22/2026	9000001576	147.89
ROSCOE		1922999	226A	CUSTODIAL SUPPLIES-TO	01/22/2026	9000001576	195.80
ROSCOE		1923848	226A	CUSTODIAL SUPPLIES-BG	01/29/2026	9000001576	168.04
ROSCOE		1923849	226A	CUSTODIAL SUPPLIES-OK	01/29/2026	9000001576	191.29
						Total for ROSCOE:	**1,397.45**
SCHNEIDERMAN, TAMMIE		2025 12 18	226	REIMBURSEMENT-ART ITEMS	12/18/2025	41746	77.86
						Total for SCHNEIDERMAN, TAMMIE:	**77.86**
SHAW MEDIA		012633065	226	BID SCHOOL IMPROVEMENT	01/31/2026	41747	161.56
						Total for SHAW MEDIA:	**161.56**
SIMON-BECKER, JOYCE		2026 02 10	226	REIMBURSEMENT-B-CDL RENEWAL	02/10/2026	41748	30.00
						Total for SIMON-BECKER, JOYCE:	**30.00**
SINITEAN, EDEN		2026 01 14	226A	REIMBURSEMENT-SCIENCE LAB MATERIALS	01/14/2026	9000001577	89.08
						Total for SINITEAN, EDEN:	**89.08**
SOARING EAGLE ACADEMY		24108	226A	TUITION JANUARY 2026	01/31/2026	41715	9,909.45
						Total for SOARING EAGLE ACADEMY:	**9,909.45**
SOLIANT		21356609	226A	CONTRACTED SCHOOL PSYCHOLOGIST 01/05/2026-01/09/2026	01/11/2026	9000001578	4,480.00
SOLIANT		21361890	226A	SCHOOL PSYCHOLOGIST	01/18/2026	9000001578	4,480.00
SOLIANT		21366882	226A	SCHOOL PSYCHOLOGIST	01/25/2026	9000001578	2,688.00
SOLIANT		21373271	226A	SCHOOL PSYCHOLOGIST	02/01/2026	9000001578	4,480.00
						Total for SOLIANT:	**16,128.00**
SUMMIT SCHOOL		36814	226A	TUITION JANUARY 2026	01/30/2026	9000001579	6,479.19
						Total for SUMMIT SCHOOL:	**6,479.19**
THE BANCROFT SCHOOL INC		8133	226A	TUITION JANUARY 2026	01/30/2026	9000001580	6,905.70
						Total for THE BANCROFT SCHOOL INC:	**6,905.70**
THE BOELTER COMAPNIES INC		9100009551	226A	COLANDER 16QT	01/09/2026	9000001581	119.03

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Vendor	PO Number	Invoice Number	Batch	Description	Invoice Date	Check Number	Net Amount
THE BOELTER COMAPNIES INC		9100023977	226A	CREDIT MEMO	02/04/2026	9000001581	-51.30
				Total for THE BOELTER COMAPNIES INC:			**67.73**
THE BUG MAN INC.		59293	226A	SCHEDULED MONTHLY SERVICE JANUARY 2026	01/31/2026	9000001582	364.00
				Total for THE BUG MAN INC.:			**364.00**
THE STEPPING STONES GROUP LLC		M0273137	226A	CONTRACTED SCHOOL PSYCHOLOGIST 01/05/2026-01/16/2026	01/23/2026	9000001583	17,367.36
THE STEPPING STONES GROUP LLC		M0275505	226A	CONTRACTED SCHOOL PSYCHOLOGIST 01/20/2026-01/30/2026	02/06/2026	9000001583	14,105.56
				Total for THE STEPPING STONES GROUP LLC:			**31,472.92**
THOMAS, JENNIFER S		2026 01 30	226	MILEAGE REIMBURSEMENT-JANUARY 2026	01/30/2026	41749	377.15
				Total for THOMAS, JENNIFER S:			**377.15**
TRUENORTH EDUCATIONAL COOPERATIVE 804		791280925	226A	PRIVATE TUITION 06/16/2025-12/31/2025	01/15/2026	9000001584	13,195.65
				Total for TRUENORTH EDUCATIONAL COOPERATIVE 804:			**13,195.65**
UNIQUE PRODUCTS & SERVICE CORPORATION	0072600000000	492697	226a	Custodial Supplies	01/20/2026	9000001585	67.92
UNIQUE PRODUCTS & SERVICE CORPORATION	0072600000000	492696	226a	Custodial Supplies	01/20/2026	9000001585	2,409.58
				Total for UNIQUE PRODUCTS & SERVICE CORPORATION:			**2,477.50**
UNITY SCHOOL BUS PARTS		0630555-IN	226A	RED STOP & TAIL	01/28/2026	9000001586	216.23
				Total for UNITY SCHOOL BUS PARTS:			**216.23**
WM J CCASSIDY TIRE & AUTO SUPPLY, LLC		925008878	226A	HEAVY TRUCK TIRE REPAIR	01/21/2026	9000001587	45.00
				Total for WM J CCASSIDY TIRE & AUTO SUPPLY, LLC:			**45.00**
ZOOS ARE US INC	1352600000000	4179	226A	PETTING ZOO 05/22/2026	01/27/2026	9000001588	402.50
				Total for ZOOS ARE US INC:			**402.50**

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Vendor	PO Number	Invoice Number	Batch	Description	Invoice Date	Check Number	Net Amount
REPORT							
Total Number of Batch Invoices:			0				0.00
Total Number of Open Invoices:			0				0.00
Total Number of History Invoices:			268				795,810.22
Total Number of Update in Progress Batch Invoices:			0				0.00
Total Number of Update in Progress Batch Reversal Invoices:			0				0.00
Total Number of Reversal History Invoices:			0				0.00
Total Number of Deleted History Invoices:			0				0.00
Total Number of Batch Reversal Invoices:			0				0.00
Total Number of Unsubmitted Invoices:			0				0.00
Total Number of Awaiting for Approval Invoices:			0				0.00
Total Invoices:			**268**				**795,810.22**

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Vendor	PO Number	Invoice Number	Batch	Description	Invoice Date	Check Number	Net Amount
ALFORD, AARON		2026 01 30	2261A	SOCIAL WORK STIPEND JANUARY 2026	01/30/2026	9000001462	1,000.00
					Total for ALFORD, AARON:		**1,000.00**
AMAZON CAPITAL SERVICES	0002600000000	1WLV-K6GV-7NFT	1263	SUPPLIES	11/25/2025	9000000549	97.57
AMAZON CAPITAL SERVICES	0002600000000	1N7C-1QVQ-L6LD	1263	CLASSROOM RUG	12/08/2025	9000000549	246.98
AMAZON CAPITAL SERVICES	0002600000000	11KC-GNV1-NQ6G	1263	SUPPLIES	01/12/2026	9000000549	14.95
AMAZON CAPITAL SERVICES	0002600000000	1V6X-HCXW-CPRJ	1263	SUPPLIES	12/21/2025	9000000549	23.08
AMAZON CAPITAL SERVICES	0002600000000	1YLV-7FTW-PVF3	1263	SUPPLIES	01/03/2026	9000000549	8.99
AMAZON CAPITAL SERVICES	0002600000000	1WFM-LKR4-CLD1	1263	Supplies	12/29/2025	9000000549	21.49
AMAZON CAPITAL SERVICES	0002600000000	1D9H-LK39-467F	1263	SUPPLIES	12/22/2025	9000000549	64.93
AMAZON CAPITAL SERVICES	0002600000000	1GGN-7Q6W-XYGK	1263	CLASSROOM SUPPLIES	12/31/2025	9000000549	45.04
AMAZON CAPITAL SERVICES	0002600000000	1K7L-3M76-79G9	1263	Admin Supplies	01/09/2026	9000000550	145.21
AMAZON CAPITAL SERVICES	0002600000000	11F6-QMRG-G6YH	1263	Traffic Signs	01/07/2026	9000000550	127.15
AMAZON CAPITAL SERVICES	0002600000000	1NY4-4KDG-VKC1	1263	Transportation/ Supplies	01/09/2026	9000000550	206.97
AMAZON CAPITAL SERVICES	0002600000000	131F-XMLN-4WHL	1263	Cary Junior High/Maintenance Supplies	01/12/2026	9000000550	425.00
AMAZON CAPITAL SERVICES	0002600000000	1Y34-YN44-14Y1	1265A	CLASSROOM SUPPLIES	12/15/2025	9000000992	96.37
AMAZON CAPITAL SERVICES	0002600000000	14GM-1VXG-NVDT	1265A	David Martin/ Supplies for the CJH	01/20/2026	9000000992	39.51
AMAZON CAPITAL SERVICES	0002600000000	11FY-PTDW-YVH6	1265A	Supplies for/ Three Oaks, Oak Knoll, Deer Path	01/20/2026	9000000992	79.92
AMAZON CAPITAL SERVICES	0022600000000	136L-J4GH-CJQM	1265A	TItle items for DP	01/22/2026	9000000992	306.53
AMAZON CAPITAL SERVICES	0032600000000	13QT-7FLG-9YL3	1265A	IPAD CASE	01/15/2026	9000000992	22.97

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AMAZON CAPITAL SERVICES	1052600000000	1R41-DTCV-LWWM	1265A	Bywulanda Upgrade USB Type C Kids Headphone for School, 94dB Safe Volume Limited, HD Stereo Sound, Foldable Lightweight On-Ear Headphones for Boys/Girls/Students/T… (quantity of 10)	01/26/2026	9000000992	99.90
AMAZON CAPITAL SERVICES	1052600000000	1M1C-H4VM-MF4C	1265A	classroom materials	01/26/2026	9000000992	67.80
AMAZON CAPITAL SERVICES	1252600000000	1XPQ-R6DJ-TN3Y	1265A	Spanish book- Espejo Merchan	01/15/2026	9000000992	12.30
AMAZON CAPITAL SERVICES	1252600000000	1GLY-TVHV-PD7H	1265A	Various musical items - Musical Order #2	01/20/2026	9000000992	77.12
AMAZON CAPITAL SERVICES	1252600000000	1XKC-Y3GG-667Y	1265A	Office Supplies-Qualls	01/20/2026	9000000992	94.03
AMAZON CAPITAL SERVICES	1252600000000	16VX-YWNH-D3X9	1265A	Office supplies- Engelmann	01/21/2026	9000000992	15.99
AMAZON CAPITAL SERVICES	1252600000000	1R7G-NHT4-LQVM	1265A	Office supplies- Engelmann	01/20/2026	9000000992	50.97
AMAZON CAPITAL SERVICES	1252600000000	1YJ1-K1RC-1VMC	1265A	Art Supplies- Cermak	01/20/2026	9000000992	353.34
AMAZON CAPITAL SERVICES	1252600000000	1H1G-L4RP-HFYP	1265A	Classroom supplies- Schuepbach	01/15/2026	9000000992	67.69
AMAZON CAPITAL SERVICES	1352600000000	1Q11-14M7-PNXY	1265A	SUPPLIES	01/20/2026	9000000992	472.11
AMAZON CAPITAL SERVICES	0032600000000	1VGR-NL99-1JCC	1265A	BRIDGE REWARD SUPPLIES	01/20/2026	9000000993	94.15
						Total for AMAZON CAPITAL SERVICES:	**3,378.06**
ANFELDT, JAMIE		2026 01 09	1263	COURSE REIMBURSEMENT-SPED553	01/09/2026	9000000551	900.00
						Total for ANFELDT, JAMIE:	**900.00**
AT&T		847462058201	1265	TELEPHONE SERVICE	01/13/2026	41696	3,235.84
						Total for AT&T:	**3,235.84**
BAY BRIDGE ADMINISTRATORS		25 ADJ.01202026.D1	1265	25 Adj - 25 ADj for Jan 20th, 2026 Payroll	01/20/2026	41693	350.00
						Total for BAY BRIDGE ADMINISTRATORS:	**350.00**

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Vendor	PO Number	Invoice Number	Batch	Description	Invoice Date	Check Number	Net Amount
BRENNAN, WILLIAM C.		1337	2261A	ATHLETIC OFFICIALS-GIRLS BASKETBALL 01/28/2026	01/28/2026	9000001453	100.00
					Total for BRENNAN, WILLIAM C.:		**100.00**
BRUNO, ANTHONY L.		1328	1264A	ATHLETIC OFFICIALS-GIRLS BASKETBALL 01/15/2026	01/15/2026	9000000988	100.00
					Total for BRUNO, ANTHONY L.:		**100.00**
CHASING CREATIVITY ART STUDIO LLC		KH-207	2261	PAINT EVENT CARY DISTRICT 26	01/28/2026	41705	325.00
					Total for CHASING CREATIVITY ART STUDIO LLC:		**325.00**
COMCAST		262740761	2261	INTERNET-ALL BUILDINGS FEBRUARY 2026	02/01/2026	41706	12,946.01
						Total for COMCAST:	**12,946.01**
COMCAST BUSINESS		2026 01 19	1265	TELEPHONE SERVICE-01/23/2026-02/22/2026	01/19/2026	41697	258.35
					Total for COMCAST BUSINESS:		**258.35**
COMMUNITY MECHANICAL AND AUTOMATION LLC		1265A	1265A	CHILLER WINTERIZE 11/07/2025	12/02/2025	9000000994	160.00
COMMUNITY MECHANICAL AND AUTOMATION LLC		3482	1265A	SEPTEMBER 2025 SERVICE CALLS	12/02/2025	9000000994	1,060.00
COMMUNITY MECHANICAL AND AUTOMATION LLC		3483	1265A	HW SYSTEM SERVICE	12/02/2025	9000000994	3,142.00
COMMUNITY MECHANICAL AND AUTOMATION LLC		3484	1265A	NOVEMBER 2025 SERVICE CALLS	12/02/2025	9000000994	3,738.00
COMMUNITY MECHANICAL AND AUTOMATION LLC		3485	1265A	NOVEMBER 2025 SERVICE CALLS	12/02/2025	9000000994	893.00
COMMUNITY MECHANICAL AND AUTOMATION LLC		3487	1265A	CHILLER WINTERIZE	12/02/2025	9000000994	160.00
COMMUNITY MECHANICAL AND AUTOMATION LLC		3488	1265A	HW SYSTEM SERVICE	12/02/2025	9000000994	2,372.00

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Vendor	PO Number	Invoice Number	Batch	Description	Invoice Date	Check Number	Net Amount
COMMUNITY MECHANICAL AND AUTOMATION LLC		3489	1265A	NOVEMBER 2025 SERVICE CALLS	12/02/2025	9000000994	160.00
COMMUNITY MECHANICAL AND AUTOMATION LLC		3490	1265A	HW SYSTEM SERVICE	12/02/2025	9000000994	1,531.00
COMMUNITY MECHANICAL AND AUTOMATION LLC		3491	1265A	NOVEMBER 2026 SERVICE CALLS	12/02/2025	9000000994	1,178.00
				Total for COMMUNITY MECHANICAL AND AUTOMATION LLC:			**14,394.00**
CORVUS INDUSTRIES LTD.		25531	1263	DEERPATH GYM REPAIR	01/09/2026	41667	4,920.00
				Total for CORVUS INDUSTRIES LTD.:			**4,920.00**
GORDON FLESCH COMPANY, INC.		IN15406142	2261A	AC TONER, PAPER, & PRINTER SUPPLIES	11/24/2025	9000001454	8,245.25
				Total for GORDON FLESCH COMPANY, INC.:			**8,245.25**
HARMAN, MATTHEW A.		1338	2261	ATHLETIC OFFICIALS WRESTLING 02/02/2026	02/02/2026	41707	100.00
				Total for HARMAN, MATTHEW A.:			**100.00**
HILLEBRAND, TIMOTHY		1336	2261A	ATHLETIC OFFICIALS-GIRLS BASKETBALL 01/28/2026	01/28/2026	9000001455	100.00
				Total for HILLEBRAND, TIMOTHY:			**100.00**
HOH WATER TECHNOLOGY, INC.		715964	1265A	DECEMBER 2025 MONTHLY WATER MANAGEMENT	12/02/2025	9000000995	747.34
				Total for HOH WATER TECHNOLOGY, INC.:			**747.34**
HOME DEPOT CREDIT SERVICES		4013674	2261	MKE SHOCKWAVE TITANIUM 1/8" BIT	01/22/2026	41708	21.91
				Total for HOME DEPOT CREDIT SERVICES:			**21.91**
ILLINOIS ASCD	1352600000000	MBR1260128	1265	Baker Membership	01/28/2026	41698	49.00
				Total for ILLINOIS ASCD:			**49.00**
ILLINOIS PRINCIPALS ASSOCIATION		502620	1263	IPA ADMINISTRATOR PO 206126	01/12/2026	41668	349.99
				Total for ILLINOIS PRINCIPALS ASSOCIATION:			**349.99**
ILMEA	0022600000000	OZ9VXTSK-0002	1263	Music Conference-Lauren Pomeroy	01/14/2026	41669	275.00
						Total for ILMEA:	**275.00**

Invoice Listing

CARY CMTY CONS SCH DIST 26N

Vendor	PO Number	Invoice Number	Batch	Description	Invoice Date	Check Number	Net Amount
INSTITUTE FOR EDUCATIONAL DEV		5308453	1264	REGISTRATION FOR REDUCING DEFIANT & ARGUMENTATIVE BEHAVIORS	01/14/2026	41687	1,650.00
						Total for INSTITUTE FOR EDUCATIONAL DEV:	**1,650.00**
INSTRUCTIONAL COACHING GROUP	0022600000000	63068887	1264A	Registration for: Chicago: Workshop Series for Leaders February 18th Amber Hefner-amber.hefner@cary26.org Kerri Wisser-kerri.wisser@cary26.org	01/14/2026	9000000989	790.00
						Total for INSTRUCTIONAL COACHING GROUP:	**790.00**
JC LICHT LLC		75973	1264A	ROLLER SHADES AND INSTALLATION	01/07/2026	9000000990	1,669.26
						Total for JC LICHT LLC:	**1,669.26**
KARKOW, JAMES		1329	1264	ATHLETIC OFFICIALS-GIRLS BASKETBALL 01/15/2026	01/15/2026	41688	100.00
						Total for KARKOW, JAMES:	**100.00**
LAUTERBACH & AMEN LLP		110562	1265A	SEPTEMBER 2025 ACCOUNTING ASSISTANCE	10/22/2025	9000000999	875.00
LAUTERBACH & AMEN LLP		110562	1265A	SEPTEMBER 2025 ACCOUNTING ASSISTANCE	10/22/2025	9000000999	-875.00
LAUTERBACH & AMEN LLP		113154	1265A	OCTOBER & NOVEMBER 2025 ACCOUNTING ASSISTANCE	12/15/2025	9000000999	500.00
LAUTERBACH & AMEN LLP		113154	1265A	OCTOBER & NOVEMBER 2025 ACCOUNTING ASSISTANCE	12/15/2025	9000000999	-500.00
LAUTERBACH & AMEN LLP		110562	1265A	SEPTEMBER 2025 ACCOUNTING ASSISTANCE	10/22/2025	9000001000	875.00
LAUTERBACH & AMEN LLP		113154	1265A	OCTOBER & NOVEMBER 2025 ACCOUNTING ASSISTANCE	12/15/2025	9000001000	500.00
						Total for LAUTERBACH & AMEN LLP:	**1,375.00**
MIDWEST TRANSIT EQUIPMENT INC.		X106051855:01	2261A	BEARING, TOP ENTRANCE DOOR, IC	10/03/2025	9000001456	20.93
MIDWEST TRANSIT EQUIPMENT INC.		X106053273:03	2261A	1 IMPACT WRENCH W-6 EXT	11/13/2025	9000001456	1,547.85
MIDWEST TRANSIT EQUIPMENT INC.		X106053498:01	2261A	CREDIT-1 IMPACT WRENCH W- 6 EXT	01/13/2026	9000001456	-1,547.85
						Total for MIDWEST TRANSIT EQUIPMENT INC.:	**20.93**
MORTENSEN, ART		1327	1264A	ATHLETIC OFFICIALS-GIRLS BASKETBALL 01/15/2026	01/15/2026	9000000991	100.00

Invoice Listing

CARY CMTY CONS SCH DIST 26N

Vendor	PO Number	Invoice Number	Batch	Description	Invoice Date	Check Number	Net Amount
MORTENSEN, ART		1335	2261A	ATHLETIC OFFICIALS-GIRLS BASKETBALL 01/28/2026	01/28/2026	9000001457	100.00
						Total for MORTENSEN, ART:	**200.00**
NCS PEARSON INC.		30235096	2261	SSIS SEL EDITION Q-GLOBAL SCORING SUBSCRIPTION 3 YEAR (DIGITAL)	10/22/2025	41709	220.00
						Total for NCS PEARSON INC.:	**220.00**
NICOR GAS		07481810005 DEC25	1263	UTILITIES GAS MW-DECEMBER 2025	01/02/2026	41670	391.92
NICOR GAS		40341810006 DEC25	1263	UTILITIES GAS OK-DECEMBER 2025	01/02/2026	41670	628.83
NICOR GAS		4395041000 1 DEC25	1263	UTILITIES GAS TO-DECEMBER 2025	01/02/2026	41670	822.98
NICOR GAS		60456113178 DEC25	1263	UTILITIES GAS CJH-DECEMBER 2025	01/02/2026	41670	1,411.18
NICOR GAS		9606641000 0 DEC25	1263	UTILITIES GAS DP-DECEMBER 2025	01/02/2026	41670	1,094.16
NICOR GAS		99531810002 DEC 25	1263	UTILITIES GAS BG-DECEMBER 2025	01/02/2026	41670	654.68
						Total for NICOR GAS:	**5,003.75**
OIL EQUIPMENT CO. INC		0373542-IN	1263	UST A/B COMPLIANCE NOVEMBER 2025	11/19/2025	9000000552	225.00
						Total for OIL EQUIPMENT CO. INC:	**225.00**
OPTUM		1840930	1264	HSA MONTHLY MAINTENANCE FEE 25-NOV	12/10/2025	41689	8.25
OPTUM		2026 01 12	1263	EE FLEX DEP/MED PLAN	01/12/2026	8000000007	782.83
OPTUM		2026 01 16	1263	EE FLEX DEP/MED PLAN	01/16/2026	8000000008	232.42
						Total for OPTUM:	**1,023.50**
PAR, INC.		IN-00522828	2261A	BRIEF 2 PARENT FORMS	10/29/2025	9000001458	444.96
						Total for PAR, INC.:	**444.96**
PEERLESS NETWORK, INC.		89584	1265A	TELEPHONE SERVICE	01/15/2026	9000000996	4,579.11
						Total for PEERLESS NETWORK, INC.:	**4,579.11**
PITNEY BOWES BANK INC PURCHASE POWER		2026 01 05	2261	POSTAGE/SUPPLIES 8000-9090-1091-4658	01/25/2026	41710	61.89
						Total for PITNEY BOWES BANK INC PURCHASE POWER:	**61.89**
PM MUSIC CENTER		2503809	1265A	Trophy TR9400 Flip Folder for Marching Lyre	08/26/2025	9000000997	78.91
						Total for PM MUSIC CENTER:	**78.91**

Invoice Listing

CARY CMTY CONS SCH DIST 26N

Vendor	PO Number	Invoice Number	Batch	Description	Invoice Date	Check Number	Net Amount
RIVER TRAILS SCHOOL DISTRICT 26	1252600000000	CARY JR HIGH 25/26	1263	Wrestling Invitational Cary Jr High	01/14/2026	41671	75.00
						Total for RIVER TRAILS SCHOOL DISTRICT 26:	**75.00**
RIVERA JR., RAFAEL		1326	1263	ATHLETIC OFFICIALS-WRESTLING 01/13/2026	01/13/2026	41672	25.00
RIVERA JR., RAFAEL		1326A	1263	ATHLETIC OFFICIALS-WRESTLING 01/13/2026	01/15/2026	41675	100.00
RIVERA JR., RAFAEL		1331	1264	ATHLETIC OFFICIALS-WRESTLING 01/20/2026	01/20/2026	41690	125.00
RIVERA JR., RAFAEL		1332	1265	ATHLETIC OFFICIALS WRESTLING	01/22/2026	41699	100.00
RIVERA JR., RAFAEL		1333	1265	ATHLETIC OFFICIALS-WRESTLING 01/26/2026	01/26/2026	41699	100.00
						Total for RIVERA JR., RAFAEL:	**450.00**
SAVVAS LEARNING COMPANY LLC		7029209616	1265A	VIRTUAL ENVMATH K/5 @2024 PD (3HR) PPD	10/08/2025	9000000998	2,300.00
SAVVAS LEARNING COMPANY LLC		7029227454	1265A	VIRTUAL ENVMATH K/5 @2024 PD (3HR) PPD	11/22/2025	9000000998	2,400.00
SAVVAS LEARNING COMPANY LLC		7029228122	1265A	VIRTUAL ENVMATH K/5 @2024 PD (3HR) PPD	11/25/2025	9000000998	2,300.00
						Total for SAVVAS LEARNING COMPANY LLC:	**7,000.00**
SCHNELL, THOMAS		1330	1264	ATHLETIC OFFICIALS-GIRLS BASKETBALL 01/15/2026	01/15/2026	41691	100.00
SCHNELL, THOMAS		1334	2261	ATHLETIC OFFICIALS GIRLS BASKETBALL 01/28/2026	01/28/2026	41711	100.00
						Total for SCHNELL, THOMAS:	**200.00**
SYMMETRY ENERGY SOLUTIONS LLC		21182134	1263	UTILITIES GAS/HEAT-DECEMBER 2025	01/09/2026	9000000553	10,965.30
						Total for SYMMETRY ENERGY SOLUTIONS LLC:	**10,965.30**
THE BUG MAN INC.		58351	1263	SCHEDULED MONTHLY SERVICE-OCTOBER 2025	10/25/2025	9000000554	395.00
						Total for THE BUG MAN INC.:	**395.00**
TOWNSHIP HIGH SCHOOL DISTRICT 214		15598	1264	RETIREMENT FRAMES	01/08/2026	41692	259.20
						Total for TOWNSHIP HIGH SCHOOL DISTRICT 214:	**259.20**

Invoice Listing

CARY CMTY CONS SCH DIST 26N

Vendor	PO Number	Invoice Number	Batch	Description	Invoice Date	Check Number	Net Amount
VERIZON WIRELESS		6134238647	2261	TELEPHONE SERVICE 12/23/2025-01/26/2026	01/22/2026	41712	593.97
						Total for VERIZON WIRELESS:	**593.97**
VILLAGE OF CARY		2026 02 01	2261	WATER & SEWER 024004370000	02/01/2026	41713	1,302.10
VILLAGE OF CARY		2026 02 01 BG	2261	WATER & SEWER BG 051500371400	02/01/2026	41713	407.58
VILLAGE OF CARY		2026 02 01 DP	2261	WATER & SEWER DP 024000020100	02/01/2026	41713	713.60
VILLAGE OF CARY		2026 02 01 OK	2261	WATER & SEWER OK 024000010001	02/01/2026	41713	431.12
VILLAGE OF CARY		2026 02 01 TO	2261	WATER & SEWER TO 024000024000	02/01/2026	41713	949.00
						Total for VILLAGE OF CARY:	**3,803.40**
WEST MUSIC		SI2584398	1263	MUSIC SUPPLIES	11/11/2025	41673	208.18
WEST MUSIC		SI2585196	1263	BLACK SWAMP TRCLIP	11/17/2025	41673	105.95
						Total for WEST MUSIC:	**314.13**
WM CORPORATE SERVICES INC.		7581589-2013-5	1263	REFUSE REMOVAL BG-JANUARY 2026	01/06/2026	41674	297.03
WM CORPORATE SERVICES INC.		7581712-2013-3	1263	REFUSE REMOVAL DP-JANUARY 2026	01/06/2026	41674	299.63
WM CORPORATE SERVICES INC.		7581713-2013-1	1263	REFUSE REMOVAL TO-JANUARY 2026	01/06/2026	41674	564.63
WM CORPORATE SERVICES INC.		7581799-2013-0	1263	REFUSE REMOVAL CJH-JANUARY 2026	01/06/2026	41674	622.79
WM CORPORATE SERVICES INC.		7582376-2013-6	1263	REFUSE REMOVAL OK-JANUARY 2026	01/06/2026	41674	482.17
						Total for WM CORPORATE SERVICES INC.:	**2,266.25**
ZANER-BLOSER INC		INVZB92266	2261A	HANDWRITING 2025 GRADE 1	09/09/2025	9000001459	3,818.87
						Total for ZANER-BLOSER INC:	**3,818.87**

Invoice Listing

CARY CMTY CONS SCH DIST 26N

Vendor	PO Number	Invoice Number	Batch	Description	Invoice Date	Check Number	Net Amount
REPORT							
Total Number of Batch Invoices:			0				0.00
Total Number of Open Invoices:			0				0.00
Total Number of History Invoices:			114				99,379.18
Total Number of Update in Progress Batch Invoices:			0				0.00
Total Number of Update in Progress Batch Reversal Invoices:			0				0.00
Total Number of Reversal History Invoices:			0				0.00
Total Number of Deleted History Invoices:			0				0.00
Total Number of Batch Reversal Invoices:			0				0.00
Total Number of Unsubmitted Invoices:			0				0.00
Total Number of Awaiting for Approval Invoices:			0				0.00
Total Invoices:			114				99,379.18

P Card Expenses						
Date	Vendor	Amount	Staff	Purpose of Purchase	Acct. #	Tax
12/18/2025	Jimmy John's	$275.25	Baker	Staff Lunch	10 E 2900 4900 00 135	$0.00
12/9/2025	Grammarly	$144.00	Block	Subscription	10 E 1110 4100 00 115	$0.00
12/15/2025	Amazon	$26.10	Block		10 E 1110 4100 00 115	$0.00
12/21/2025	Dunkin	$83.51	Block	Day of Giving	10 E 1110 4100 00 115	$0.00
12/17/2025	ISPA	$75.00	DeRoo	Job Fair	10 E 2640 4100 00 000	$0.00
12/09/2025	Amazon	$106.98	Fitzsimons	Laptop Screen Replacement	10 E 2660 4000 00 000	$0.00
12/11/2025	Amazon	$16.98	Fitzsimons	Batterries	10 E 2660 4000 00 000	$0.00
12/18/2025	Amazon	243.23	Fitzsimons	Conference Area Display	10 E 2660 4000 00 000	$0.00
12/15/2025	IL Tollway	$100.00	Kubala	IPass Reload	40 E 2550 6400 00 000	$0.00
12/5/2025	IASBO	$545.00	Martin	2026 Conference Reg Fees	10 E 2520 6400 00 000	$0.00
12/5/2025	IASBO	$205.00	Martin	2026 FPC School District Registration	10 E 2520 6400 00 000	$0.00
12/9/2025	Menards	$31.37	Martin	Snow Shovels	20 E 2540 3200 00 115	$0.00
12/10/2025	Menards	$54.76	Martin	Snow Shovels	20 E 2540 3200 00 100	$0.00
12/16/2025	Occupational Training	$365.00	Martin	Training	10 E 2520 6400 00 000	$0.00
12/15/2025	Black Market Bakery	$254.41	Nass	Staff Christmas Gift	10 E 2900 4900 00 100	$0.00
12/17/2025	Deluxe	$1,271.69	Shepherd	Reorder of Checks	10 E 2520 4100 00 000	$87.42
12/18/2025	Rosati's	$57.18	Shepherd	School Board Dinner	10 E 2310 6400 00 000	$0.00
12/18/2025	Texan BBQ	$221.35	Shepherd	Christmas Lunch	10 E 2900 4900 00 000	$0.00
12/12/2025	IPA	$225.00	Shirley	Admin Academy	10 E 2410 6400 00 125	$0.00
12/3/2025	Walmart	$67.81	Thomas	TLC	10 E 1205 4100 00 000 4620	$0.00



Cary Community Consolidated School District 26

FY 2026 Treasurer's Report

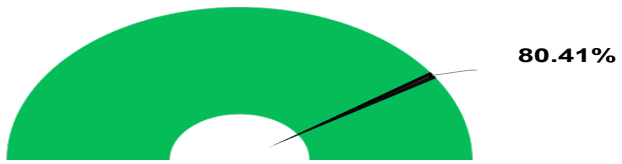
Month Ending January 31 2026

Revenue Summary

For the Period Ending January 31, 2026

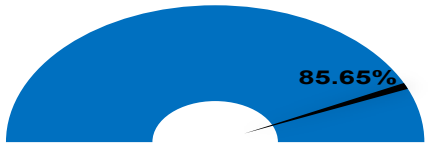
Educational | Operations and Maintenance | Transportation | IMRF/SS | Working Cash | Tort

Total Revenues (YTD)



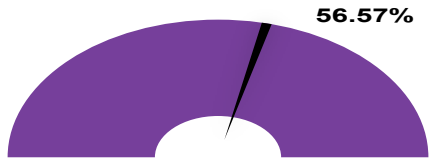
Historical Trend: 79.52%

Local Revenues (YTD)



Historical Trend: 85.19%

State Revenues (YTD)

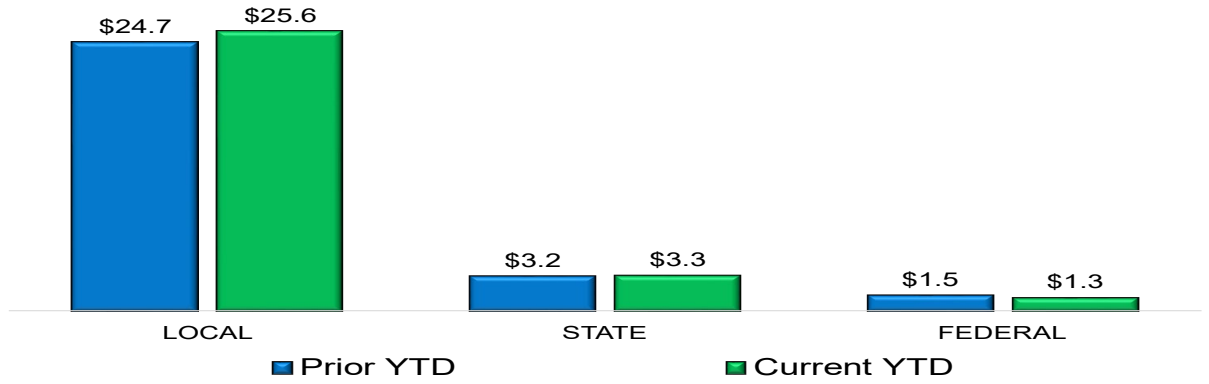


Historical Trend: 56.08%

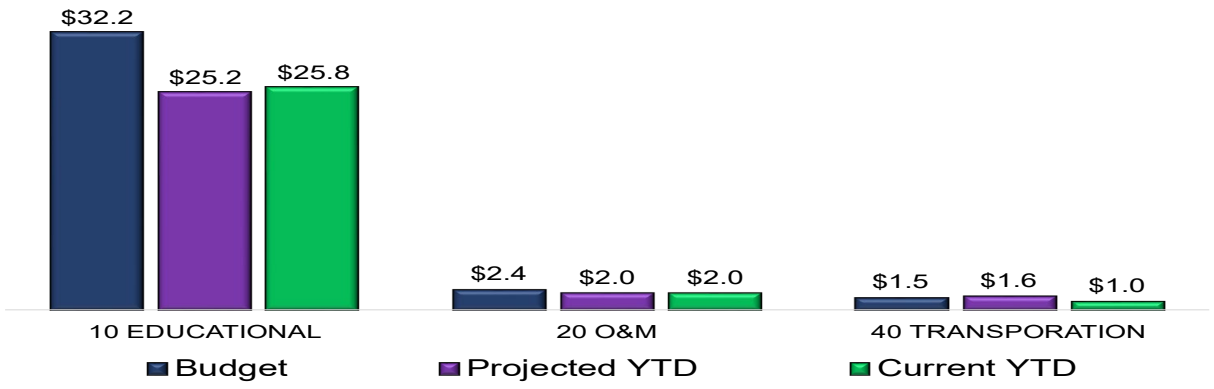
Top 10 Sources of Revenue YTD

Ad Valorem Taxes	$24,229,234
Unrestricted Grants-in-Aid	$2,541,780
Federal Special Education	$685,495
State Transportation Reimbursement	$503,353
Earnings on Investments	$382,011
Payments in Lieu of Taxes	$283,201
Food Service	$265,314
Textbook Income	$207,570
Title I	$193,748
Food Service	$185,061
Percent of Total Revenues Year-to-Date	**99.62%**

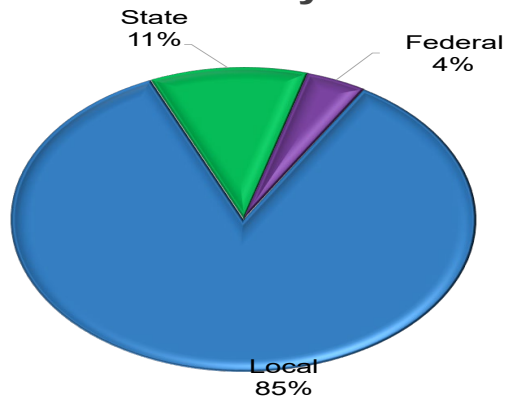
Revenues by Source (Millions)



Revenues by Major Fund (Millions)



YTD Revenues by Source



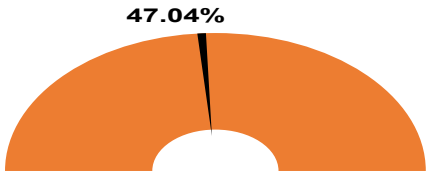
Frontline Analytics

Expense Summary

For the Period Ending January 31, 2026

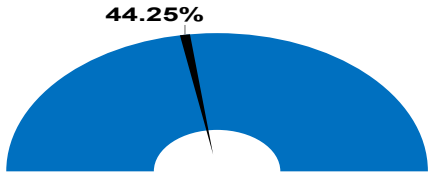
Educational | Operations and Maintenance | Transportation | IMRF/SS | Working Cash | Tort

Total Expenses (YTD)



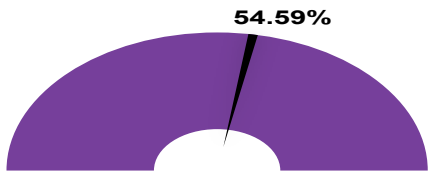
Historical Trend: 48.47%

Salaries & Benefits (YTD)



Historical Trend: 46.39%

All Other Objects (YTD)

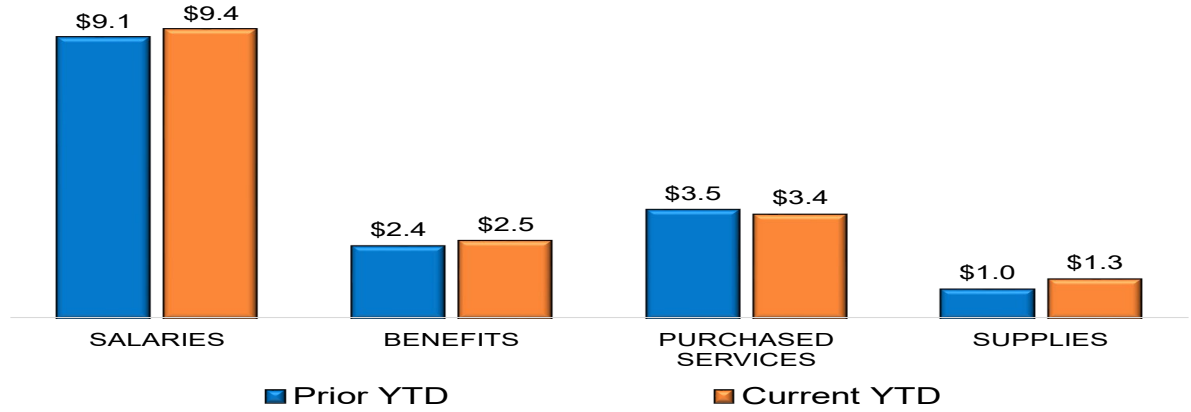


Historical Trend: 54.13%

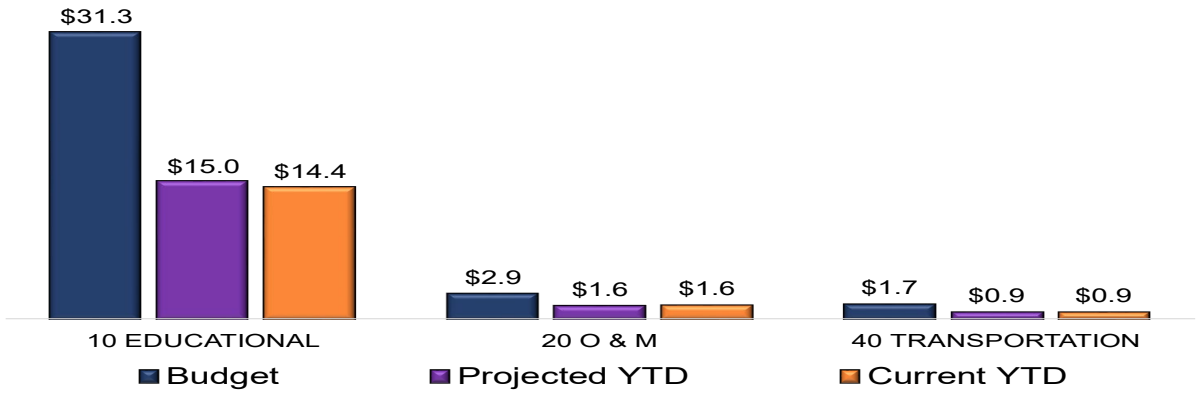
Top 10 Expenses YTD

Regular Programs	$5,030,285
Support Services - Business	$3,421,925
Special Education/Remedial Programs	$1,882,279
Support Services - Pupils	$1,282,906
Support Services - School Administration	$1,115,902
Support Services - Instructional Staff	$860,320
Payments to Other Govt. Units (In-State)	$841,118
Support Services - Central	$836,486
Support Services - General Administration	$744,794
Bilingual Programs	$627,743
Percent of Total Expenses Year-to-Date	**95.75%**

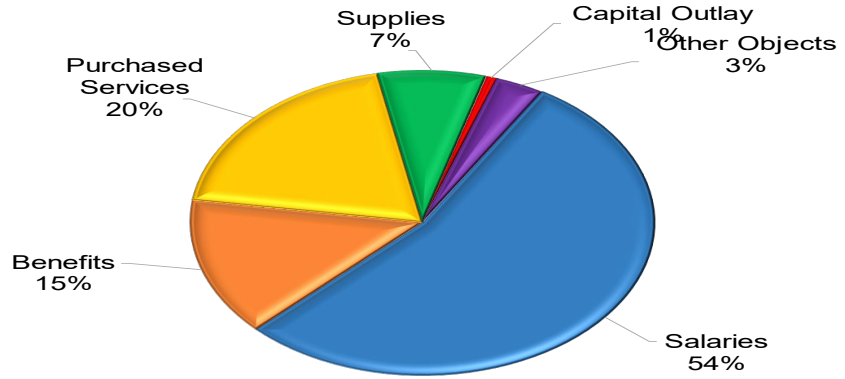
Expenditures by Object (Millions)



Expenses by Major Fund (Millions)



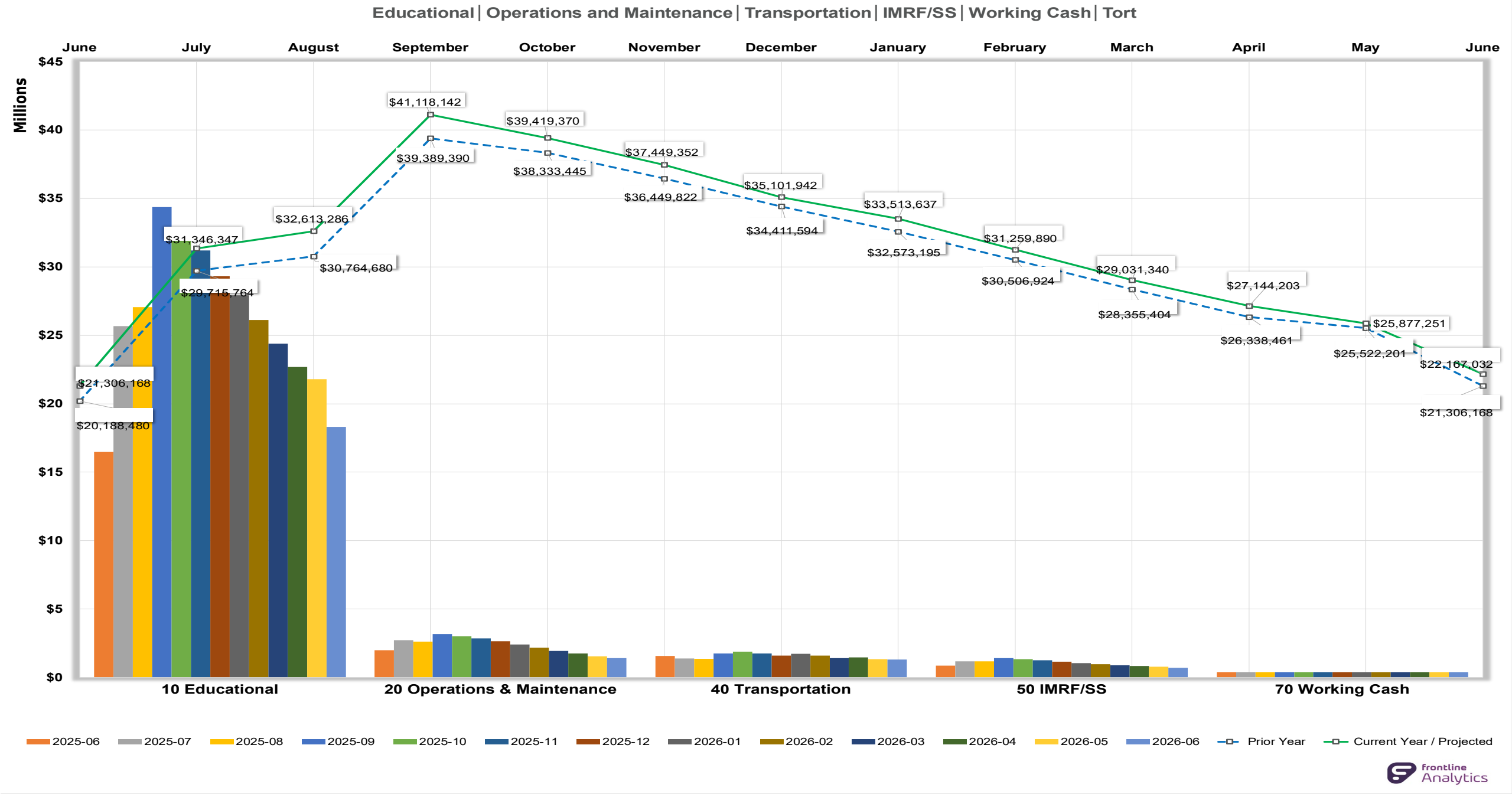
YTD Expenses by Object



frontline Analytics

Month-End Fund Balances

For the Period Ending January 31, 2026

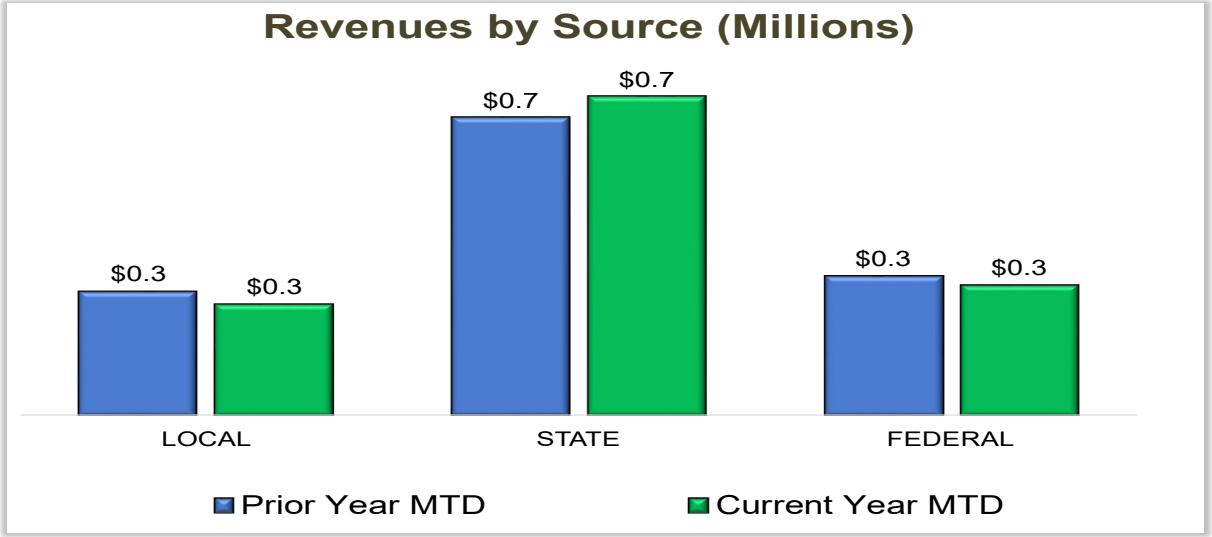


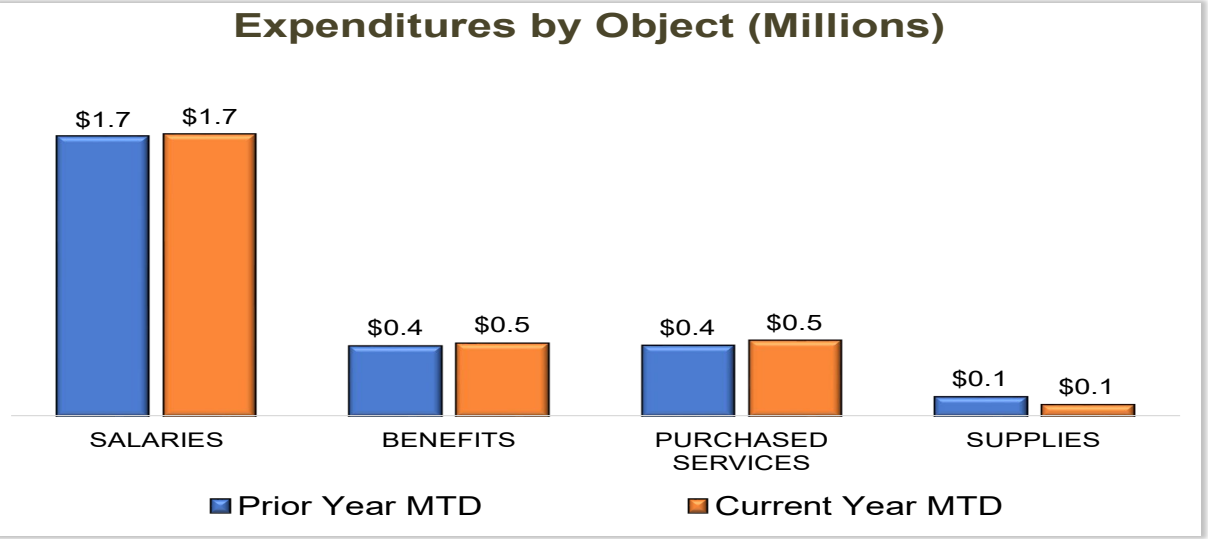
frontline Analytics

Current Month Summary

For the Month Ending January 31, 2026

	Prior Year MTD	Current Year MTD	% Change	Educational	Operations & Maintenance	Debt Services	Transportation	IMRF/SS	Capital Projects	Working Cash	Tort	Fire Prev. & Safety
REVENUES												
Local	$289,297	$260,527	*(9.94%)*	$191,922	$23,814	$792	$8,801	$0	$35,199	$0	$0	$0
State	694,841	744,140	*7.10%*	495,848	0	0	248,292	0	0	0	0	0
Federal	325,749	305,430	*(6.24%)*	305,430	0	0	0	0	0	0	0	0
Other	0	0		0	0	0	0	0	0	0	0	0
TOTAL REVENUES	**$1,309,886**	**$1,310,097**	***0.02%***	**$993,200**	**$23,814**	**$792**	**$257,093**	**$0**	**$35,199**	**$0**	**$0**	**$0**
EXPENDITURES												
Salaries	$1,712,022	$1,732,011	*1.17%*	$1,637,051	$15,215	$0	$79,745	$0	$0	$0	$0	$0
Benefits	433,055	453,173	*4.65%*	341,662	6,783	0	16,048	88,680	0	0	0	0
Purchased Services	437,267	468,824	*7.22%*	274,665	169,219	0	24,940	0	0	0	0	0
Supplies	125,726	75,574	*(39.89%)*	16,079	56,330	0	3,165	0	0	0	0	0
Capital Outlay	1,148,114	193,682	*(83.13%)*	6,640	0	0	0	0	187,042	0	0	0
Other Objects	2,622,196	1,182,732	*(54.90%)*	126,189	0	1,056,543	0	0	0	0	0	0
Non-Cap Equipment	1,277	0	*(100.00%)*	0	0	0	0	0	0	0	0	0
Termination Benefits	0	0		0	0	0	0	0	0	0	0	0
TOTAL EXPENDITURES	**$6,479,656**	**$4,105,996**	***(36.63%)***	**$2,402,286**	**$247,546**	**$1,056,543**	**$123,898**	**$88,680**	**$187,042**	**$0**	**$0**	**$0**
SURPLUS / (DEFICIT)	**($5,169,769)**	**($2,795,899)**	***(45.92%)***	**($1,409,086)**	**($223,732)**	**($1,055,751)**	**$133,194**	**($88,680)**	**($151,844)**	**$0**	**$0**	**$0**
SOURCES / (USES)												
Other Financing Sources	$5,525,000	$0		$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Financing Uses	$0	$0		$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL SOURCES / (USES)	**$5,525,000**			**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SURPLUS / (DEFICIT)	**$355,231**	**($2,795,899)**		**($1,409,086)**	**($223,732)**	**($1,055,751)**	**$133,194**	**($88,680)**	**($151,844)**	**$0**	**$0**	**$0**
Beginning of Month Fund Balance	$36,305,552	$36,958,384	*1.80%*	$29,325,225	$2,631,428	$1,259,713	$1,594,465	$1,147,627	$596,730	$403,196	$0	$0
End of Month Fund Balance	**$36,660,783**	**$34,162,485**	***(6.81%)***	**$27,916,139**	**$2,407,696**	**$203,962**	**$1,727,659**	**$1,058,946**	**$444,886**	**$403,196**	**$0**	**$0**





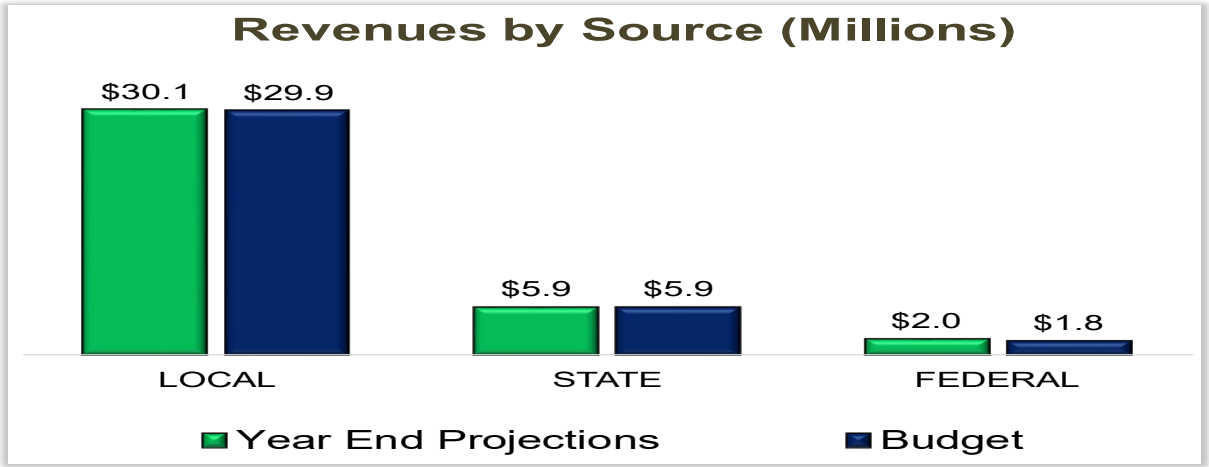
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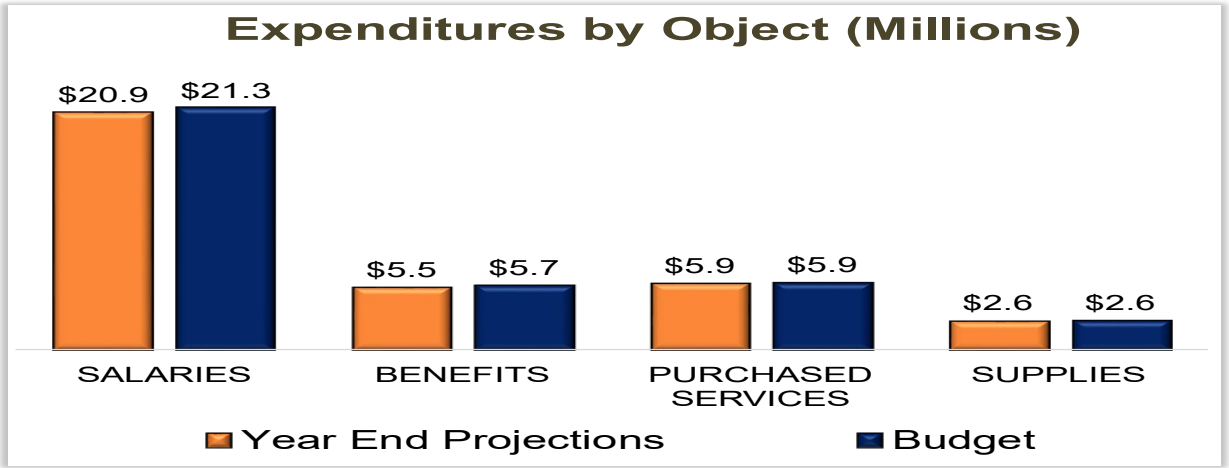
Year End Projections

For the Period Ending January 31, 2026

Educational | Operations and Maintenance | Transportation | IMRF/SS | Working Cash | Tort

	Prior Actuals YTD	Current Actuals YTD	Remaining Months Projections	Year End Projections	Current Budget	Variances Favorable (Unfavorable)
REVENUES						
Local	$24,652,740	$25,630,248	$4,433,090	$30,063,338	$29,924,345	$138,993
State	3,233,116	3,315,422	2,574,209	5,889,632	5,860,917	28,715
Federal	1,489,945	1,265,592	687,506	1,953,098	1,784,310	168,788
Other	0	0	0	0	0	0
TOTAL REVENUES	**$29,375,801**	**$30,211,262**	**$7,694,805**	**$37,906,067**	**$37,569,572**	**$336,495**
EXPENDITURES						
Salaries	$9,145,454	$9,404,096	$11,507,347	$20,911,444	$21,315,651	$404,207
Benefits	2,373,398	2,544,802	2,968,993	5,513,795	5,686,995	173,200
Purchased Services	3,547,561	3,397,211	2,471,005	5,868,216	5,925,132	56,916
Supplies	966,813	1,299,981	1,268,631	2,568,612	2,595,914	27,302
Capital Outlay	156,457	141,560	380,335	521,895	609,299	87,404
Other Objects	507,249	594,388	420,657	1,015,045	790,581	(224,463)
Non-Cap Equipment	3,386	0	24,442	24,442	31,000	6,558
Termination Benefits	0	0	0	0	0	0
TOTAL EXPENDITURES	**$16,700,317**	**$17,382,040**	**$19,041,409**	**$36,423,449**	**$36,954,572**	**$531,124**
SURPLUS / (DEFICIT)	**$12,675,484**	**$12,829,223**	**($11,346,604)**	**$1,482,618**	**$615,000**	**$867,619**
OTHER SOURCES / (USES)						
Other Financing Sources	($290,769)	($621,753)	($1)	($621,754)	($615,000)	($6,754)
Other Financing Uses	$0	$0	$0	$0	$0	$0
TOTAL OTHER SOURCES / (USES)	**($290,769)**	**($621,753)**	**($1)**	**($621,754)**	**($615,000)**	**($6,754)**
SURPLUS / (DEFICIT)	**$12,384,715**	**$12,207,470**		**$860,864**	**$0**	**$860,865**
ENDING FUND BALANCE	**$32,573,195**	**$33,513,637**		**$22,167,032**	**$21,306,168**	**$860,863**





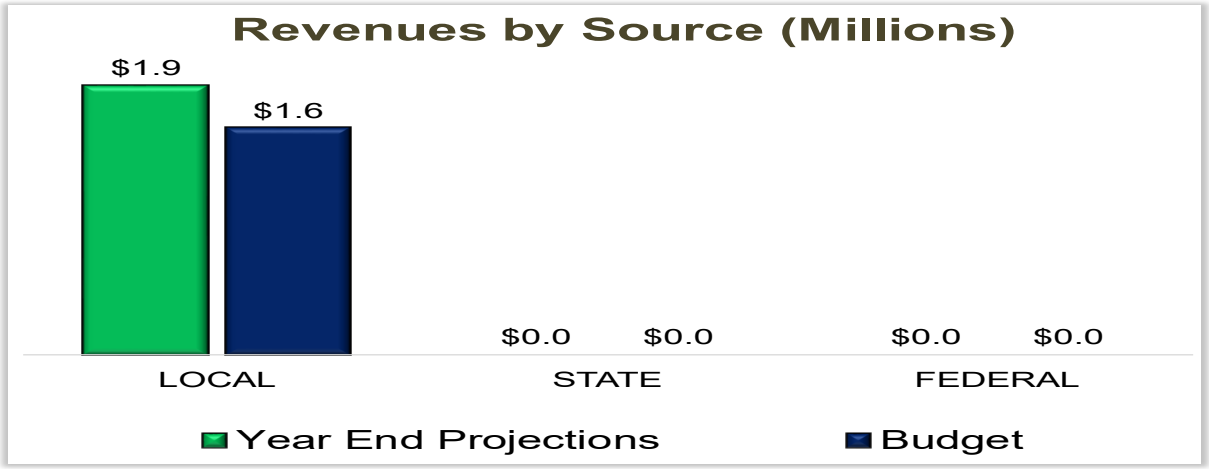
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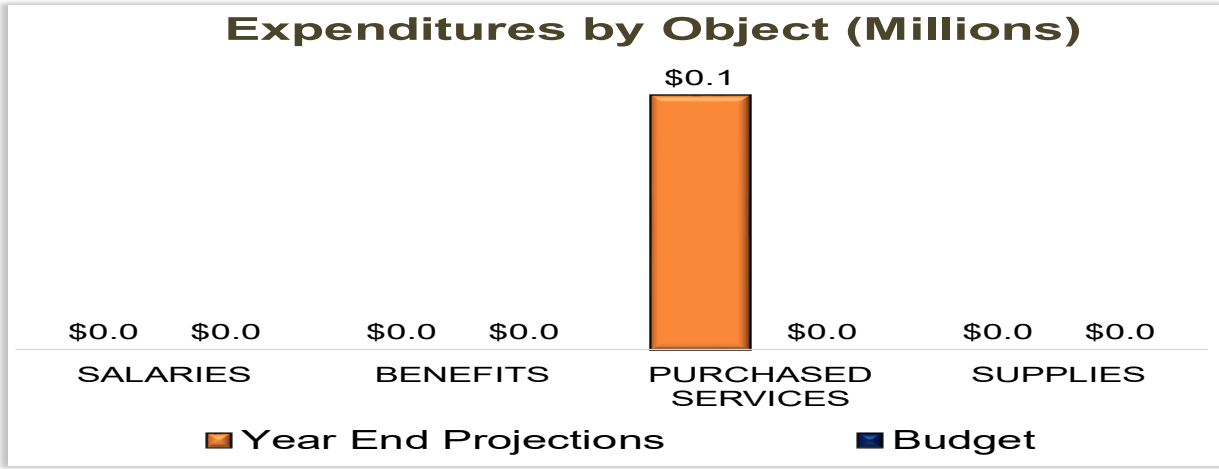
Year End Projections

For the Period Ending January 31, 2026

| Debt Service | Capital Projects

	Prior Actuals YTD	Current Actuals YTD	Remaining Months Projections	Year End Projections	Current Budget	Variances Favorable (Unfavorable)
REVENUES						
Local	$2,033,088	$1,580,058	$306,355	$1,886,413	$1,588,633	$297,780
State	50,000	0	0	0	0	0
Federal	0	0	0	0	0	0
Other	0	0	0	0	0	0
TOTAL REVENUES	**$2,083,088**	**$1,580,058**	**$306,355**	**$1,886,413**	**$1,588,633**	**$297,780**
EXPENDITURES						
Salaries	$0	$0	$0	$0	$0	$0
Benefits	0	0	0	0	0	0
Purchased Services	101,785	53,802	0	53,802	0	(53,802)
Supplies	0	0	0	0	0	0
Capital Outlay	1,268,506	4,952,891	5,574,743	10,527,634	12,500,000	1,972,366
Other Objects	2,552,485	2,060,704	177,334	2,238,038	2,053,633	(184,405)
Non-Cap Equipment	0	0	0	0	0	0
Termination Benefits	0	0	0	0	0	0
TOTAL EXPENDITURES	**$3,922,776**	**$7,067,397**	**$5,752,077**	**$12,819,474**	**$14,553,633**	**$1,734,159**
SURPLUS / (DEFICIT)	**($1,839,688)**	**($5,487,339)**	**($5,445,722)**	**($10,933,061)**	**($12,965,000)**	**$2,031,939**
OTHER SOURCES / (USES)						
Other Financing Sources	$5,815,769	$621,753	$256,250	$878,003	$615,000	$263,003
Other Financing Uses	$0	$0	$0	$0	$0	$0
TOTAL OTHER SOURCES / (USES)	**$5,815,769**	**$621,753**	**$256,250**	**$878,003**	**$615,000**	**$263,003**
SURPLUS / (DEFICIT)	**$3,976,081**	**($4,865,586)**		**($10,055,058)**	**($12,350,000)**	**$2,294,942**
ENDING FUND BALANCE	**$4,087,588**	**$648,848**		**($4,540,624)**	**($6,835,566)**	**$2,294,941**





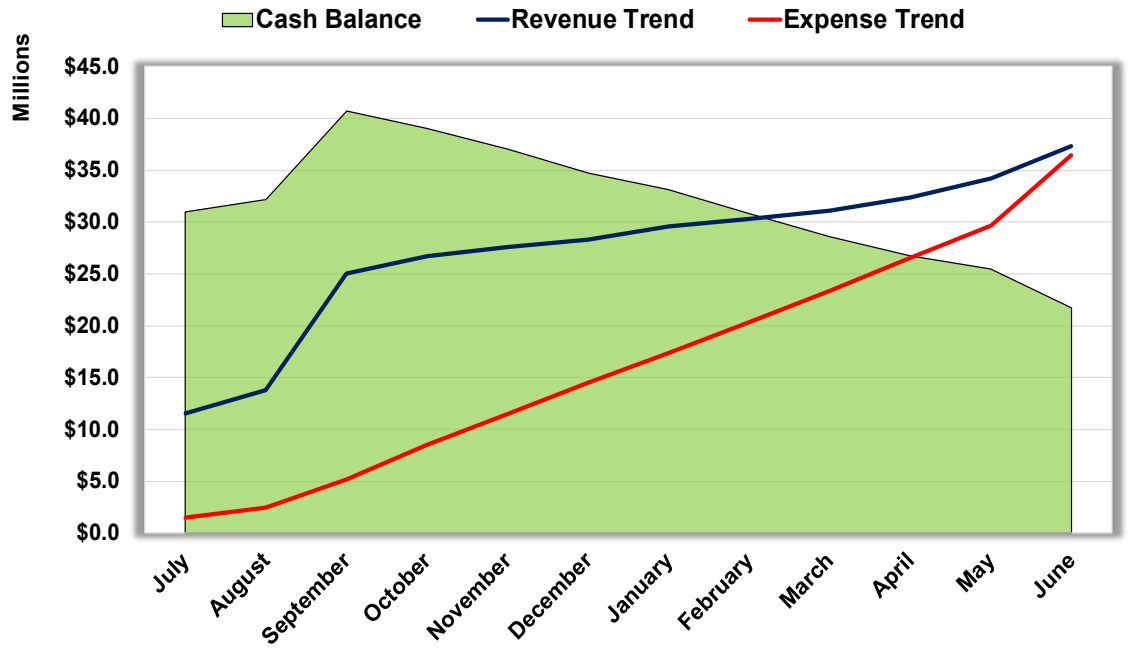
frontline Analytics

2026 Cash Flow Projection

Educational | Operations & Maintenance | Transportation | Municipal Retirement/Social Security

	July Actual	August Actual	September Actual	October Actual	November Actual	December Actual	January Actual	*February Projected*	*March Projected*	*April Projected*	*May Projected*	*June Projected*	Year to Date Actual	*Year End Projected*
Beginning Cash Balance	**$20,902,972**	**$30,943,151**	**$32,210,090**	**$40,714,946**	**$39,016,174**	**$37,046,156**	**$34,698,746**	***$33,110,441***	***$30,856,694***	***$28,628,144***	***$26,741,007***	***$25,474,055***	**$20,902,972**	**$20,902,972**
Cash Flow Summary														
Revenues (Cash In)	11,520,059	2,269,333	11,221,196	1,666,602	925,296	712,917	1,274,106	*705,410*	*773,118*	*1,295,270*	*1,872,478*	*3,048,528*	29,589,509	37,284,313
Expenditures (Cash Out)	1,479,880	1,002,394	2,716,340	3,365,374	2,895,314	3,060,327	2,862,411	*2,959,158*	*3,001,667*	*3,182,407*	*3,139,430*	*6,758,747*	17,382,040	36,423,449
Adjustments	0	0	0	0	0	0	0	*0*	*0*	*0*	*0*	*0*	0	0
Net Cash Flow	**$10,040,180**	**$1,266,939**	**$8,504,856**	**($1,698,772)**	**($1,970,018)**	**($2,347,411)**	**($1,588,304)**	***($2,253,748)***	***($2,228,550)***	***($1,887,137)***	***($1,266,952)***	***($3,710,219)***	**$12,207,470**	**$860,864**
Ending Cash Balance	**$30,943,151**	**$32,210,090**	**$40,714,946**	**$39,016,174**	**$37,046,156**	**$34,698,746**	**$33,110,441**	***$30,856,694***	***$28,628,144***	***$26,741,007***	***$25,474,055***	***$21,763,836***	**$33,110,441**	**$21,763,836**

Operating Fund Summary	
Fund 10 (Education)	$1,830,709
Fund 20 (Operations/Maintenance)	($564,867)
Fund 40 (Transportation)	($244,426)
Fund 50 (IMRF/Social Security)	($160,552)



frontline Analytics

Investments

Investments as of 1/31/2026						
Description	Settlement Date	Trade Date	Purchase Price	Principal	Maturity Date	Yield to Maturity
CD - Cendera Bank	12/4/2025	12/4/2025	$ 246,700.00	$249,924.27	4/17/2026	3.56%
Third Coast	1/12/2026	1/12/2026	$ 246,500.00	$249,877.25	1/12/2026	3.57%
CD - Merrick Bank	7/1/2025	7/1/2025	$ 242,700.00	$249,912.83	3/30/2026	3.98%
CD- Quaint Oak Bank	8/1/2025	8/1/2025	$ 242,600.00	$249,871.62	4/28/2026	4.05%
CD- RVR Bank	8/1/2025	8/1/2025	$ 242,600.00	$249,944.30	4/28/2026	4.09%
CD-Financial Federal	8/1/2025	8/1/2025	$ 242,700.00	$249,881.26	4/28/2026	4.00%
CD- MapleMark Bank	8/1/2025	8/1/2025	$ 242,700.00	$249,877.81	4/28/2026	3.99%
CD- First Bank PR	8/1/2025	8/1/2025	$ 242,700.00	$249,899.21	4/28/2026	4.01%
CD-NexBank	8/1/2025	8/1/2025	$ 242,500.00	$249,930.96	4/28/2026	4.14%
CD-Bank of Houston	8/4/2025	8/4/2025	$ 242,700.00	$249,773.54	5/1/2026	3.94%
CD-Oklahoma Capital	8/4/2025	8/4/2025	$ 242,900.00	$249,926.61	5/1/2026	3.91%
CD-Customers Bank	7/1/2025	7/1/2025	$ 240,300.00	$249,878.87	7/1/2026	3.98%
CD-First Nat. Bnk of Hutchinsc	7/1/2025	7/1/205	$ 240,400.00	$249,895.80	7/1/2026	3.95%
CD-Cornerstone Bank	7/1/2025	7/1/2025	$ 240,200.00	$249,865.65	7/1/2026	4.02%
CD-NorthEast	7/1/2025	7/1/2025	$ 240,400.00	$249,941.48	7/1/2026	3.97%
CD-Harmony Bank	7/1/2025	7/1/2025	$ 240,300.00	$249,896.35	7/1/2026	3.99%
CD-Royal Business Bank	7/1/2025	7/1/2025	$ 240,100.00	$249,920.48	7/1/2026	4.09%
CD - First Bank Southwest	12/4/2025	12/4/2025	$ 246,600.00	$249,861.44	4/17/2026	3.60%
CD - Western Alliance	12/4/2025	12/4/2025	$ 246,100.00	$249,945.41	5/4/2026	3.77%
CD - American Plus Bank	9/24/2025	9/24/2025	$ 245,500.00	$249,879.99	3/19/2026	3.70%
CD - Patriot Bank	9/24/2025	9/24/2025	$ 245,500.00	$249,879.99	3/19/2026	3.70%
CD - Bank of Crockett	9/24/2025	9/24/2025	$ 245,500.00	$249,888.87	3/19/2026	3.71%
CD- Security Bank	9/24/2025	9/24/2025	$ 245,500.00	$249,879.99	3/19/2026	3.70%
CD - Preferred Bank	9/24/2025	9/24/2025	$ 245,400.00	$249,913.70	3/19/2026	3.81%
CD - Integro Bank	9/24/205	9/24/2025	$ 245,500.00	$249,882.95	3/19/2026	3.70%
U.S. Treasury Bill	9/25/2025	9/25/2025	$ 499,176.68	$508,000.00	3/19/2026	3.69%
CD - BOC Bank	12/4/2025	12/4/2025	$ 245,700.00	$249,878.76	5/4/2026	4.11%
CD - BOM Bank	12/4/2025	12/4/2025	$ 246,100.00	$249,894.52	5/4/2026/	4.19%
CD- Affinity Bank, Nat Assoc.	1/28/2025	1/28/2025	$ 235,400.00	$249,912.80	7/28/2026	4.12%
CD- Baxter Credit Union	1/28/2025	1/28/2025	$ 230,900.00	$249,842.84	1/28/2027	4.10%
CD- KS State Bank	1/28/2025	1/28/2025	$ 231,000.00	$249,849.80	1/28/2027	4.08%
CD-Signature BK of Arkansas	1/31/2025	1/28/2025	$ 249,333.33	$249,000.00	1/29/2027	4.08%
CD - First Bank of Richmond	2/5/2025	1/29/2025	$ 244,225.27	$244,000.00	8/5/2026	4.06%
CD - Morgan Stanley	2/5/2025	1/29/2025	$ 244,508.54	$244,000.00	8/5/2026	4.06%
CD- Bank of America	2/5/2025	1/29/2025	$ 244,508.54	$244,000.00	8/5/2026	4.06%
CD-North Alabama Bank	2/6/2025	1/29/2025	$ 244,280.53	$244,000.00	8/6/2026	4.07%
CD - Goldman Sachs Bank	2/4/2025	1/28/2025	$ 244,668.08	$244,000.00	2/4/2027	4.11%
U.S. Treasury Bill	9/24/2025	9/24/2025	$1,249,236.88	$1,264,000.00		
CD - Morgan Stanley Pvt	2/5/2025	1/29/2025	$ 244,667.68	$244,000.00	2/5/2027	4.16%
LIQ Account Bal			$507,607.33	$ 507,607.33		
MAX Account Bal			$ 1,043,808.57	$ 1,043,808.57		
			$12,289,721.43	**$12,533,145.25**		

January 31, 2026			
Fund	LIQ	MAX	Total
Capital Improvement 2024	$0.26	$11,516,308.63	$11,516,308.89
$35198.51 earned in interest for January 2026			





Any Questions?

Resignation/Dismissal - February 2026

Name	Position	Building	Action	Effective Date
Emily Sauer	7th Grade Science Teacher	CJH	Resignation	6/1/2026
David Shepherd	Associate Superintendent of Finance & Operations	AC	Resignation	6/1/2026

Retirement- February 2026

Name	Position	Building	Action	Effective Date
Kimberly Ryan	Health Clerk/Sub Coor.	CJH	Retirement	**June 2026**
Laurie Ann Lee	Spec. Resource Teacher	TO	Retirement	**June 2029**

Memo

To: **Board of Education**

From: **Dr. Jennifer Thomas, Interim Superintendent**

Date: **January 23, 2026**

Re: **Policy 2:220 – E1 Treatment of Closed Session Audio Recordings**

Board Policy allows the District to destroy Closed Session Audio Recordings older than 18 months. The Superintendent is requesting that the old inventory of Recorded Closed Session Minutes be destroyed according to Policy 2:220 to free up storage space and be in compliance with this Policy.

In addition, the IASB recommends that the destruction of closed meeting audio recordings be done on a monthly basis. A regular consent agenda item will be added to the Regular Board Meeting agenda for the routine destruction of closed meeting audio recordings that are older than 18 months and for which the approved minutes of the closed meeting already exist.

Recommendation: The Superintendent is recommending that the Board of Education monthly approves the destruction of particular closed meeting recordings that are at least 18 months old and for which approved minutes of the closed meeting already exist. This is in accordance with Board Policy 2:220-E2.

RESOLUTION REQUIRING A
BALANCED BUDGET
FOR FISCAL YEAR 2026-2027

A RESOLUTION to require the Cary Community Consolidated School District 26 Administration to present to the Board of Education only balanced budget options for the 2026-2027 fiscal year.

WHEREAS, the Cary Community Consolidated School District 26 Board of Education is responsible for the financial wellbeing of the District; and

WHEREAS, the Administration presented to the Board of Education a balanced budget for the past twelve consecutive fiscal years; and

WHEREAS, the Board of Education strongly believes that an unbalanced budget would cause great harm to the District,

NOW, THEREFORE, BE IT RESOLVED BY CARY COMMUNITY CONSOLIDATED SCHOOL DISTRICT 26 BOARD OF EDUCATION THAT:

The Administration must present to the Board of Education only balanced budget options for the 2026-2027 fiscal year. In so doing, it will present the necessary steps it believes are required in order to cause the budget to be in balance. The Administration will identify the necessary steps to be taken to cause a balanced budget in consideration of what it believes will result in the least impact to the students of the District overall.

Adopted and approved this 23rd day of February, 2026, upon motion made by _____ and seconded by _____. For the adoption of the foregoing resolution, a roll call vote was taken. The members voted as follows:

Yeas_____
Nays_____
Absent_____

_____ _____
Board President Board Secretary

RESOLUTION TO APPROVE DESIGNEE
TO PREPARE TENTATIVE BUDGET
FOR THE FISCAL YEAR 2026-2027

WHEREAS, by the provisions of Chapter 105, Article 5/17-1 of the Illinois School Code, this Board of Education of Cary Community Consolidated School District 26, McHenry and Lake Counties, Illinois, is required to adopt an annual budget before the end of the first quarter of each fiscal year and,

WHEREAS, the Board of Education establishes the fiscal year to begin July 1, 2026 and,

WHEREAS, the tentative budget shall be made available for public inspection for at least 30 days prior to final action thereon and,

WHEREAS, at least one public hearing shall be held as to such budget prior to final action thereon and,

WHEREAS, the Board of Education is required to designate a person to prepare in tentative form the budget for fiscal year 2026-27

NOW THEREFORE BE IT AND IT IS HEREBY RESOLVED by this Board of Education of Cary Community Consolidated School District 26, McHenry and Lake Counties, Illinois, that the Superintendent or designee of Cary Community Consolidated School District 26 be designated as the person to prepare the 2026-2027 fiscal year budget in tentative form and to make such budget available as required by Illinois School Code.

Adopted and approved this 23rd day of February, 2026, upon motion made by _____ and seconded by _____. For the adoption of the foregoing resolution, a roll call vote was taken. The members voted as follows:

Yeas_____

Nays_____

Absent_____

_____ _____
Board President Board Secretary

CARY COMMUNITY CONSOLIDATED SCHOOL DISTRICT

2115 Crystal Lake Road • Cary, Illinois 60013 • Phone: (224) 357-5100 • Fax: (847) 639-3898

Briargate • Deer Path • Oak Knoll •Three Oaks • Cary Junior High

Rental Application
District 26 Facilities and Equipment

Date of Request:

Building Requested:	Room or Facility:	
Date Building Requested:	***(See Attachment 1 for more than one Date)***	
Day of Week:	Start Time: a.m. / p.m.	Time Vacated: a.m. / p.m.
Name of Organization:		
Authorized Representative:	Phone Number:	
Address:	District 26 Resident? ☐ Yes ☐ No	
Briefly explain the purpose or program:		
E-Mail:		

OFFICE USE ONLY

_____ _____
Building Principal Approval Date Approved

_____ _____
Administration Center Approval Date Approved

_____
Custodian Assigned

Certificate of Insurance? ☐ Yes ☐ No

Expiration Date: _____

Amount of Fee Charged: _____

Complete Schedule Provided if Applicable. ☐ Yes ☐ No

Copy of Rental Agreement provided to applicant? ☐ Yes ☐ No

Custodial Fees: _____

Set Up/Break Down Fees: _____

Additional Fees: _____

Head Custodian Reviewed Set-up requests: _____ Date: _____

Make a Copy of Completed Form and Retain for Your Records

Revised 2/10/2026

CARY COMMUNITY CONSOLIDATED SCHOOL DISTRICT

2115 Crystal Lake Road • Cary, Illinois 60013 • Phone: (224) 357-5100 • Fax: (847) 639-3898

Briargate • Deer Path • Oak Knoll • Three Oaks • Cary Junior High

Rental Agreement
District 26 Facilities and Equipment

Agreement No. _____

This Agreement entered into this ____ day of _____, 20___, between the Board of Education of Cary Community Consolidated School District 26, McHenry County, Illinois, (the "Board" or the "District") and _____ (the "User").

PAYMENT: All people applying must be 21 years or older. All applicants must complete an application, including submission of all supporting documents required and pay the application fee. **All applicants are financially responsible if the organization they are representing defaults in payment to the school district. RENTAL FEES ARE DUE UPON RECEIPT OF INVOICE. Failure to pay will be submitted to a collection agency.**

Rental Agreements will not be accepted prior to August 1st for the following school year.

A. The User is authorized to use District facilities/equipment as described below:

Fields are closed from the last day of school through August 1st.

1. **School facilities/equipment to be used**: _____

   _____

2. **Facilities/equipment are to be used for:** _____

   _____

3. **Maintenance fees** (if applicable):
4. **District contact for building arrangements**: District Operations Coordinator (224-357-5100)
5. **Set–Up request. Please describe requested set-up for function.**

_____

_____

_____

_____

_____

_____

_____

_____

_____

B. It is expressly understood and agreed by the User that:

1. **Additional Fees.** The User will be billed for any costs associated with the User's use of the District's facilities/equipment beyond the period set forth in Paragraph A.3, including, but not limited to any associated snow plow, salting , maintenance and/or custodial fees**. If the Renter requests items that must be moved from a location other than the one being rented, additional fees will be accessed**.

2. **Insurance.** Prior to using the facilities/equipment, the User shall obtain general liability insurance in an amount and with a carrier acceptable to the District, insuring its indemnification obligation under this Agreement and naming the Board and its individual members, employees, and agents as additional insured.

3. **No Vaping, Tobacco, or Alcohol.** The User shall ensure that none of its participants consume alcohol, vaping, or tobacco products on school grounds when the User is using or scheduled to use the facilities/ equipment.

4. **Scope of Use.** The User may only use the facilities/equipment described above for the period of use authorized under this Agreement. **The User must ensure that unauthorized portions of District facilities/equipment are not used and that the premises are vacated as scheduled**. The user must make sure coaches, participants, and parents are notified that they are not to be in unauthorized portions of the building at any time.

5. **Distribution of Materials.** The User may only distribute material to its participants, and only in the area that has been approved for use. The User may not post any materials in or on District property, except while the facility is in use by the User. Any material distributed that displays the school as a location for an event must clearly state that the event is not a school-sponsored event.

6. **Damage to and Maintenance of Property.** The User assumes full responsibility for any damage to or loss of District property arising from or in any way connected with the subject activity and agrees to repair or replace such property promptly, without expense to the District. **No HARDBALLS are to be used inside the Buildings for Baseball/Softball practice. Indoor rubber balls only.** The User shall ensure that the area(s) used are left in a neat and clean condition. The User shall be responsible for all costs associated with cleaning the area(s) used by the User.

7. **Denial of Access.** In the event the User fails to abide by the terms of this Agreement, as determined by the school official in charge, the User and individuals using the facility may be denied future use of District facilities/equipment. By exercising this right, the District does not waive any other rights or remedies to which it may be entitled under law.

8. **Supervision.** The User must supervise its participants at all times and maintain an adequate level of safety.

9. **Release of Claims.** THE USER RECOGNIZES THAT CERTAIN HAZARDS AND DANGERS ARE INHERENT IN ANY PHYSICAL ACTIVITY AND THAT ITS PARTICIPANTS VOLUNTARILY ASSUME SUCH RISKS, INCLUDING, WITHOUT LIMITATION, THE CONDITION OF THE SCHOOL FACILITIES/EQUIPMENT. THE USER ACKNOWLEDGES AND UNDERSTANDS THAT THE BOARD AND ITS INDIVIDUAL BOARD MEMBERS, OFFICERS, AGENTS, REPRESENTATIVES, EMPLOYEES AND VOLUNTEERS MAKE NO REPRESENTATIONS OR WARRANTIES AS TO THE CONDITION OF ANY OF THE SCHOOL FACILITIES/EQUIPMENT AND THAT THE USER IS UTILIZING SUCH FACILITIES/EQUIPMENT AT ITS OWN RISK.FURTHER, IN EXCHANGE FOR THE PRIVILEGE OF UTILIZING THE SCHOOL'S FACILITIES/EQUIPMENT, THE USER HEREBY IRREVOCABLY RELEASES THE BOARD OF EDUCATION OF CARY COMMUNITY CONSOLIDATED SCHOOL DISTRICT NO. 26, ITS INDIVIDUAL BOARD MEMBERS, OFFICERS, AGENTS, REPRESENTATIVES, EMPLOYEES, AND VOLUNTEERS, FROM ANY AND ALL RESPONSIBILITY, LIABILITY, CLAIMS, DAMAGES, OR LOSSES (INCLUDING, BUT NOT LIMITED TO, ANY CLAIMS BASED UPON ALLEGED NEGLIGENCE OR GROSS NEGLIGENCE), FOR PERSONAL INJURY, DAMAGE, ACCIDENT, ILLNESS, OR LOSS INCURRED AS A RESULT OF, ARISING FROM, OR RELATED TO THE USER'S USE OF ANY SCHOOL FACILITY.

10. **Indemnification.** The User agrees to indemnify and hold harmless the Board and its individual members, employees, and agents, jointly and severally, from and against any loss, damage, claim, demand, cause of action, or liability, including, without limitation, costs in defense of any lawsuit, that may arise out of, relate to, or be caused in any way by the subject use or activity; that may arise through the non-availability of school facilities/equipment because of necessary school use or other intervening occurrences beyond the control of those hereby indemnified; or that may arise by reason of termination of this Agreement as provided herein.

11. **Termination.** The District may terminate this Agreement at any time, without liability, but in such case, it shall reimburse any fees already paid to the District by the User.

12. **Compliance with Laws.** The User shall comply with all applicable federal, state, and local statutes, laws, rules, and regulations pertaining to the User's use of the District's facilities/equipment and its operation of any programs therein.

13. **Nondiscrimination.** The User shall comply with all federal, state, and local anti-discrimination laws, including, but not limited to, the *Illinois Human Rights Act*, the *Americans with Disabilities Act*, and all federal Equal Employment Opportunity laws.

14. **Sex Offenders.** The User acknowledges that, pursuant to the Illinois *Criminal Code* (720 ILCS 5/11-9.3), it is unlawful for a child sex offender to knowingly be present on school property when persons under the age of eighteen (18) are present without the specific notification and permission. The User shall ensure that none of its participants, personnel, employees, agents, contractors, or employees thereof are child sex offenders. Child sex offenders found to be present on District property without written permission will be considered trespassers and will be prosecuted in accordance with Illinois law.

15. **Governing Law and Waiver of Jury.** This Agreement shall be governed by the laws of the State of Illinois, and any action relating to this Agreement must be brought in the Circuit Court of McHenry County, Illinois or the U.S. District Court for the Northern District of Illinois, Eastern Division. To the fullest extent permitted by law, the User waives any right to a jury trial that it may have at law or in equity in enforcing his or her rights under this Agreement.

16. **Kitchen Use.** Rental of cafeteria does not include use of Kitchen.
If school kitchens are requested to be used for preparation and or serving food, then someone who holds an Illinois Sanitation Certification from the **Districts Food Service Provider** must be on premises during the event to supervise from start of preparation through clean up. The rental group may set up these arrangements through the building Principal. The Certified Food Service Worker will receive a per hour fee paid directly to them by the renter. **Contacting the Certified Food Service Worker is to be conducted by the building Principal only (refer to the attached list for the available Organic Life contacts and calling procedures)**.

17. **Schedules**. If the User is requesting multiple dates and times, a complete schedule must accompany the signed usage agreement prior to approval by the District.

18. **Field Usage.** Users are responsible for walking fields prior to each usage, daily and make sure the area is free of debris and hazards. Cones should be used to mark any holes, manholes, or other tripping hazards. No using Building as a backboard is allowed. Fields are closed from the last day of school through August 1st.

19. **School Closings.** When the District closes any or all of the Building due to Snow, Extreme Temperatures, Equipment Failure, Severe Weather Warnings or Forecasts, etc. Rentals will be canceled.

20. **Blackout Dates.** The buildings will not be rented on School Holidays. The buildings will not be rented during Winter or Spring Break except for Cary Junior High the week after Christmas only.

21. **Snow Plowing and Salting Fees.** For weekend rentals during winter months the User will be charged $250 for snow removal and salting fees if their event is the only event scheduled at the facility.

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A Certified Sanitation Worker must be Present

- When kitchen facilities are to be used
- When non-sealed factory packaged food is present
- Presence of non-sealed factory packaged food at a public attended event

Name of Sanitation Worker working event (*REQUIRED)*

If a sanitation worker is not a **District 26 Food Service Provider** a copy of their sanitation certificate must be attached to this usage agreement. In addition, a copy of their certificate must accompany them for the event. **They are not allowed to use the Kitchen**

A Certified Sanitation Worker is not required

- Classroom activities where open food is present
- At public events where only, sealed factory packaged food is present

---

USER

Name (printed): _____

Signature: _____

Address: _____

_____

Telephone: _____

Date: _____

BOARD OF EDUCATION
CARY COMMUNITY CONSOLIDATED
SCHOOL DISTRICT 26

By: _____

Its: _____

Date: _____

PLEASE SIGN AND RETURN ORIGINAL COPY – DO NOT FAX

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If any or all of the Building are closed due to inclement weather or some other unforeseen reason the scheduled rental for those days will be cancelled and must be rescheduled or refunded.

Cancellation Policy Cancellations must be made in writing 14 days prior to the scheduled event. Failure to cancel will result in full Rental Fee Charges per the Rental Agreement.

Requirement-**One hour minimum** when Custodian Normally on Duty
Requirement-**Two hour minimum** when Custodian NOT Normally on Duty.

The following table represents the Facility Rental Fee structure. Heat and air conditioning will not be provided. **Kitchens will not be rented.**

Cary CCSD 26 Facility Rental Fee

Effective July 1st,2026

Organization	Custodian Normally on Duty	Custodian NOT Normally on Duty
Classroom Resident	$25.00/Hour/Room	$25.00/Hour/Room $40.00 Custodian Fee/Hour $40.00 Set-up/Breakdown Fee
Classroom Non-Resident	$35.00/Hour/Room $40.00 Set-up/Breakdown Fee	$35.00/Hour/Room $40.00 Custodian Fee/Hour $40.00 Set-up/Breakdown Fee

Organization	Custodian Normally on Duty	Custodian NOT Normally on Duty
Gymnasium Resident	$50.00/Hour/Room	$50.00/Hour/Room $40.00 Custodian Fee/Hour $40.00 Set-up/Breakdown Fee
Gymnasium Non-Resident	$60.00/Hour/Room $40.00 Set-up/Breakdown Fee	$60.00/Hour/Room $40.00 Custodian Fee/Hour $40.00 Set-up/Breakdown Fee

Individuals with Illinois State Sanitation Certificates and District Food Service Contracted Workers

(NOTE: Contacting of the Certified Food Service Worker is to be conducted by the building Principal only)

Contact the Organic Life Food Service Provider Director Diane Verner to hire a Certified Sanitation Worker. Diane Verner can be contacted at 224-357-5140.

When contacting Diane to employ a Certified Sanitation Worker, Principal should provide them with the following information:

- Instructions as to what type of event is being held.
- The date, start time and approximate ending time for the event.
- The location of the event.
- The services required by the staff, such as serving food, cleaning etc. (inform worker of type of foods and beverages to be served)
- If there are any special needs.

All supplies are provided by the District unless other arrangements have been made.

DATES REQUESTED

Day	Date	Start Time	Time Vacated

ATTACHMENT 1

Revised 2/10/2026



Staffing Plan

2026-2027

EXCELLENCE IN EDUCATION

26

ENGAGE, EMPOWER, EXCEL



Outcomes



- To provide an overview of current enrollment across the district

- To ensure staff is aligned to support the district in meeting its strategic plan goals

Strategic Plan Goals



- **Student Success**

  Empowering student growth toward a successful future through a whole – child learning approach

- **District Learning Culture**

  Provide a learning culture that fosters belonging for students and staff to become confident and motivated to succeed

- **Exceptional Staff**

  Attract and retain highly qualified staff and nurture a collaborative culture where everyone is valued and empowered

- **Strategic Partnerships**

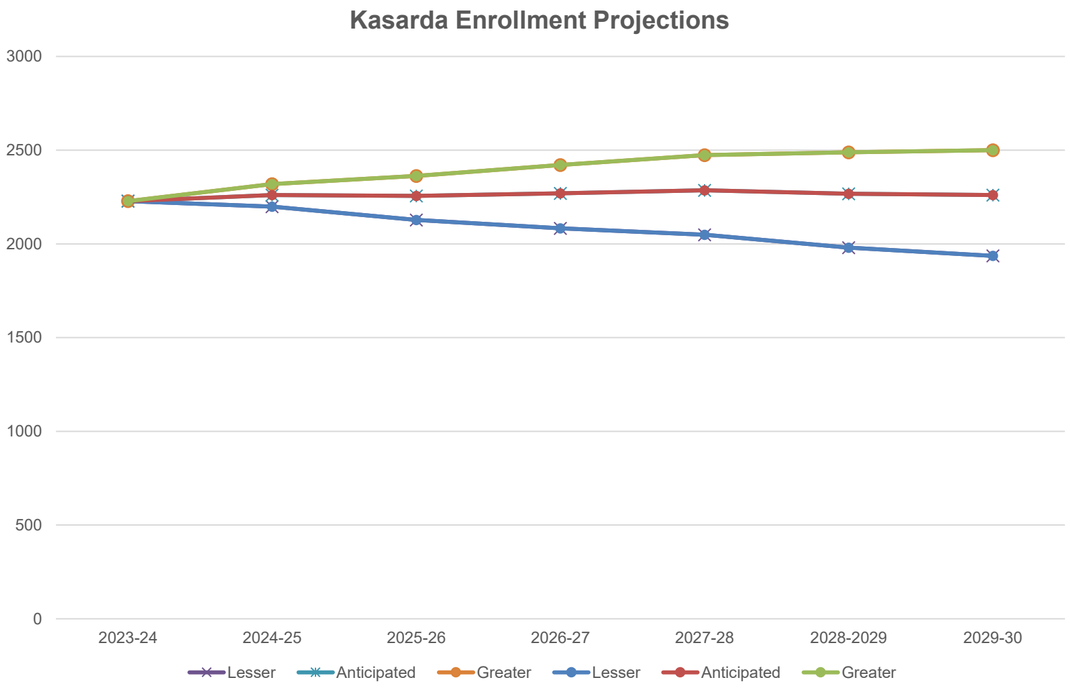
  Actively engage families and the community as vital partners in the educational experience

- **Fiscal Responsibility**

  Align resources to district priorities to provide support and add value for students, staff, and community



District Enrollment Trends



Anticipated Enrollment 2026-27: 2460 Students



Oak Knoll

Oak Knoll







No classroom staffing changes for the 2026-2027

School	Grades	Student	Sections	Teachers	Class Size	Changes
Oak Knoll	PFA	16	1	0.5	16.0	0.0
	ARISE PS	34	2	1	17.0	0.0
	Blended PS	52	4	2	13.0	0.0
	ECE	22	4	2	5.5	0.0
	Trans K	6	1	1	6.0	0.0
	K	164	9	9	18.2	0.0
	Total Oak Knoll	294	21	15.5		0.0



Briargate

Briargate







No net change in classroom staffing for 2026-2027

School	Grades	Student	Sections	Teachers	Class Size	Changes
Briargate	1	54	3	3	18	-1.0
	2	77	4	4	19.25	+1.0
	3	68	3	3	22.6	0.0
	4	74	3	3	24.6	-1.0
	5	84	4	4	21	+1.0
	Total Briargate	357	17	17		0.0



Deer Path

Deer Path







A reduction of 1.0 Classroom positions for 2026-2027

School	Grades	Student	Sections	Teachers	Class Size	Changes
Deer Path	1	67	3	3	22.33	-1.0
	2	83	4	4	20.75	+1.0
	3	67	3	3	22.3	0.0
	4	64	3	3	21.3	0.0
	5	77	3	3	25.6	-1.0
	TLC	24	3	3	8	0.0
	Total Deer Path	382	19	19		-1.0



Three Oaks

Three Oaks







A reduction of 1.0 Classroom positions for 2026-2027

School	Grades	Student	Sections	Teachers	Class Size	Changes
Three Oaks	K DL	46	2	2	23	0.0
	1 DL	46	2	2	23	0.0
	1	48	2	2	24	0.0
	2 DL	42	2	2	21	0.0
	2	48	2	2	24	0.0
	3 DL	33	2	2	16.5	0.0
	3	48	2	2	24	-1.0
	4DL	37	2	2	18.5	0.0
	4	76	3	3	25.33	0.0
	5DL	29	2	2	14.5	0.0
	5	68	3	3	22.66	0.0
	Elem Bridge	4	1	1	4.0	0.0
	Total Three Oaks	525	25	25		-1.0



Cary Junior High

Cary Junior High







No change in classroom positions for 2026-2027

School	Grades	Student	Sections	Teachers	Class Size	Changes
Cary Junior High	6	260	12	12	21.6	0.0
	7	292	12	12	24.3	0.0
	8	250	12	12	20.8	0.0
	DL	87	4	4	21.75	0.0
	TLC	9	2	2	4.5	0.0
	Bridge	4	1	1	4.0	0.0
	Total CJH	902	43	43		0.0

Financial Implications

Position	Building	FTE	Cost*
First Grade Reduction	Briargate	-1.0	-$55,000
Second Grade Allocation	Briargate	1.0	$55,000
Fourth Grade Reduction	Briargate	-1.0	-$55,000
Fifth Grade Allocation	Briargate	1.0	$55,000
First Grade Reduction	Deer Path	-1.0	-$55,000
Second Grade Allocation	Deer Path	1.0	$55,000
Fifth Grade Reduction	Deer Path	-1.0	-$55,000
Third Grade Reduction (Mono)	Three Oaks	-1.0	-$55,000
Total:		**-2.0**	**-$110,000**

***Includes salary and benefits**



Next Steps

- Finalize Open Positions List and initiate the Transfer Process
- Hire staff for any unfilled positions
- Ongoing review of Special Education staffing needs by building
- Monitor class sizes throughout the spring and summer as students transfer in/out of the district



Questions

CARY SCHOOL DISTRICT 26
Department of Educational Technology

2115 Crystal Lake Road | Cary, Illinois 60013 | Phone: (224) 357-5100 | Fax: (847) 639-3898

To: Board of Education

From: Andrew Fitzsimons, Technology Coordinator
Ivette Rivera, Assistant Superintendent of Teaching & Learning

Date: February 17, 2026

Re: Technology Purchase Plan

Purpose

What is pedagogy? Professor Emeritus, Michael Fullan, defines pedagogy as the driving force for educational change. He states that it is a dynamic and partnership-based relationship between teacher and student where both parties co-design the learning experience to achieve deep learning.

When talking about the use of technology in “Deep Learning Design”, Fullan says that “Pedagogy is the driver - digital is the accelerator”. Fullan goes on to state that there are six global competencies for “Deep Learning”. While the District referenced Liz Kolb’s Triple E Framework in the construction of our Instructional Framework, the work done also closely aligns with the “Six Global Competencies” of deep learning.

Six Global Competencies for Deep Learning (New Pedagogies for Deep Learning) https://deep-learning.global	D26 Instructional Framework Classroom Culture & Environment - 2.2 Technology, Innovation, Digital Wellness
Character • Proactive stance toward life and learning to learn • Grit, tenacity, perseverance and resilience • Empathy, compassion and integrity in action	**Learning First, Technology Second** • Engagement **Empowering Responsible Digital Citizens** • Digital literacy and safety lessons **Empowering Responsible Digital Citizens** • Time management and healthy technology habits
Citizenship • A global perspective • Commitment to human equity and well-being through empathy and compassion for diverse values and world views • Genuine interest in human and environmental sustainability • Solving ambiguous and complex problems in the real world to benefit citizens	**Learning First, Technology Second** • Extension **Cultivating Innovative Thinkers** • Real-world connections **Empowering Responsible Digital Citizens** • Digital etiquette and privacy discussions
Collaboration • Working interdependently as a team • Interpersonal and team-related skills • Managing team dynamics and challenges	**Learning First, Technology Second** • Extension **Cultivating Innovative Thinkers** • Open-ended questions and collaboration
Communication • Communication designed for audience and impact	**Cultivating Innovative Thinkers** • Open-ended questions and collaboration

• Message advocates a purpose and makes an impact • Reflection to further develop and improve communication • Voice and identity expressed to advance humanity	**Empowering Responsible Digital Citizens** • Digital etiquette and privacy discussions
Creativity • Economic and social entrepreneurialism • Asking the right inquiry questions • Pursuing and expressing novel ideas and solutions • Leadership to turn ideas into action	**Cultivating Innovative Thinkers** • Brainstorming and design thinking challenges **Cultivating Innovative Thinkers** • Real-world connections
Critical Thinking • Evaluating information and arguments • Making connections and identifying patterns • Meaningful knowledge construction • Experimenting, reflecting and taking action on ideas in the real world	**Learning First, Technology Second** • Enhancement **Cultivating Innovative Thinkers** • Brainstorming and design thinking challenges **Cultivating Innovative Thinkers** • Open-ended questions and collaboration **Empowering Responsible Digital Citizens** • Critical thinking and online research skills

Why is this important? While technology was once considered optional in the classroom or a method of digitizing the status quo, it has become an essential catalyst for innovation, creativity, and deeper student connection. The status quo mindset is setting up today's learners for failure in future educational endeavors or their life's journey post-education because society has become more technology-centric than ever before. **As Michael Fullan has stated, pedagogy is the driver and digital is the accelerator.** The instructional strategy is a must, but gone are the days when digital tools cannot be used as part of those strategies. In other words they are not mutually exclusive and they work together to create deep learning that will propel our learners into future phases of their lives on a path of success.

The following document will outline some of the digital tools that help accelerate our learners on their deep learning journey. Included will be the financial considerations for those digital tools and the safety measures that are in place to keep our students safe on their path.

Student Device Monitoring & Safety

Student safety is a critical component of the District's efforts to integrate technology into the educational process. Cary School District 26 utilizes Lightspeed Systems for real time content analysis, device security, and web filtering. These systems provide protection for **all** of our students on District devices no matter where they are in the world.

1. **Lightspeed Alert**
   - **Purpose**: provides real time content analysis that scans Google Docs, Google Sheets, and Google Slides for text and images that could be considered a safety risk. It scans all of these documents as changes are made and immediately sends notifications to Building Administrators that a safety risk is taking place.
   - **How It Works**: Lightspeed Alert categorizes its findings as Self-Harm, Violence, Sexual Abuse/Exploitation, Bullying, Weapons, and Drugs to help Building Administrators investigate the safety concern. With Lightspeed Alert the District is not alone in monitoring these safety concerns as they occur. Human Review, by a Lightspeed Safety Team member, is part of the service. They monitor the "Alerts" as they occur in English, Spanish, Portuguese, and Haitian Creole languages and will issue a "High Alert" if they deem necessary. When a "High Alert" is issued, individuals within the District are called 24/7 to alert them of the risk.
2. **Lightspeed Mobile Device Management**
   - **Purpose**: allows the District to not only push apps and web clips out to our devices, but also to set security policies.

- **How It Works**: An example of a security policy for all student devices is the prevention of app installation. That means that no student can install an app on their iPad that hasn't been approved and made available in the App Portal, which is cultivated in Lightspeed Mobile Device Management.

3. **Lightspeed Web Filter**
   - **Purpose**: provides web filtering on all student devices at all times. Lightspeed Relay is a Children's Internet Protection Act (CIPA) web filter that aids the district in preventing access to websites that are deemed or could be deemed inappropriate for children. Beyond filtering internet activity, the Lightspeed Web Filter allows the district to turn off internet access over night.

   - **How It Works**: Currently the District is blocking internet access on all student iPads starting at 11:00PM on a nightly basis. The web history of every student is logged based on their student assigned device and stored by the Lightspeed Web Filter for 90 days. These web histories are often part of any Threat Assessment investigation that is happening within a school.

     Currently the Web Filter is configured to:
     - Force Google SafeSearch
     - Force Google Verbatim Search
     - Force Google Image Search Thumbnails
     - Restrict Image Search to Images Labeled For Reuse Only

     The Web Filter is set to block websites that fall into the following categories:
     - Social Media
     - Unknown .Zip and .Mov TLDs
     - Access Denied
     - Mature
     - Mature - Art
     - Mature - Body Art
     - Mature - Games
     - Mature - Language
     - Alcohol
     - Drugs
     - Gambling
     - Porn
     - Suspicious
     - Forums
     - Forums - Blogs
     - Forums - Dating
     - Forums - Email
     - Forums - IM
     - Forums - Newsgroups
     - Forums - p2p
     - Forums - Personals
     - Forums - Social Networking
     - Artificial Intelligence
     - AI - Generative
     - AI - Detective
     - Security
     - Security - Malware
     - Security - Nettools
     - Security - Proxy
     - Security - Shorteners
     - Security - Translators
     - Security - Warez
     - Violence
     - Ads
     - Parked
     - Spam
     - Spam - Shopping
     - Weapons
     - Plagiarism
     - Kids & Teens - Chat
     - Expired
     - Shopping
     - Shopping - Auctions
     - Shopping - Office Supplies
     - Sports - Esports

     YouTube is a tool that is integrated into many curricular tools so it can not be blocked outright. To help protect our students on YouTube, the Lightspeed Web Filter incorporates SmartPlay which is an education-focused, machine-learning categorization of videos. However, at this time it is not fully used due to many lesson embedded videos falling outside of the SmartPlay parameters.

4. **Lightspeed Alert & Web Filter**

   - **How It Works**: Numbers 1 & 3 combined also work together to provide content analysis on search (i.e. Google searches) terms that may indicate safety risks or threatening situations including Self-Harm, Violence, Bullying, Weapons, and Drugs.

Other security tools to help the District keep our students safe include:

5. **Apple Classroom**

- **Purpose**: gives our teachers the ability to control many aspects of their student's iPads while they are in the learning environment. This software helps teachers guide learning, share work, and manage student devices.

- **How It Works**: Teachers can launch a specific app, website, or textbook page on any student iPad in the classroom. Teachers can also see which apps students are working in, mute student devices, lock students into an app or website, and when class ends, the teacher can view a summary of how their students' spent their time. Apple Classroom helps to promote accountability, guide instructional decisions, and provide targeted feedback to support student learning.

6. **Student Online Personal Protection Act (SOPPA)**
   - **Purpose:** requires that the District's designated Data Privacy Office, Lynn Williams, to vet all District software and verify if it collects "Personal Identifiable Information (PII).

   - **How It Works:** An agreement with any software that collects PII must be signed. A software vendor is considered SOPPA compliant if the following criteria is met:
     - Not using PII data for targeted ads
     - Not profiling students except in furtherance of school purposes
     - Not selling or renting student information
     - Not disclosing information unless required by law or as part of maintenance and development of services
     - Using reasonable security practices
     - Deleting student data when requested
     - Publicly disclosing information about its use, terms of service, agreement, and privacy policy.

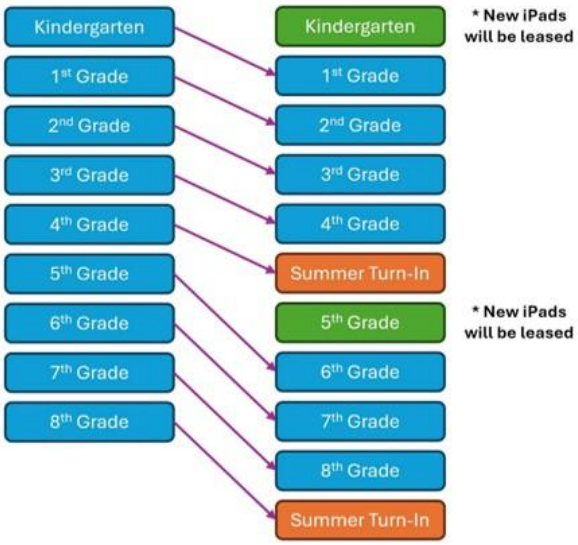
     As part of the District's compliance with SOPPA regulations a list of our software vendors and their SOPPA compliance can be found here on the website.

7. **Google API Security**
   - **Purpose:** accounts can be utilized to log into and create accounts for many different websites and services.

   - **How It Works:** However, the District has student Google accounts configured to not allow this without request. If the request is not approved access will be denied to create an account with the website or service. Student Google accounts are not allowed to share outside of the @cary26.org domain and new documents of any type are set "Private" by default. Students are also not allowed to create '"Shared Drives" within the Google Domain. In addition, Google Chat, Meet, and Voice are disabled for all students.

Student Assigned Devices

As in previous purchase plans, our students in **kindergarten, first, and second grade will keep their iPads at school** while not in attendance. Students in **grades third through eighth will be allowed to take their school issued device home**.



The image to the left outlines the rollout plan for the District's issued devices. **Students currently enrolled in kindergarten, first, second, and third grades will advance to the next grade level and utilize the same iPad** that they have been using during this school year. The same is true for students currently enrolled in fifth, sixth, and seventh grades.

Students currently enrolled in fourth grade will continue to turn-in their iPads prior to leaving for the summer break unless they have confirmed attendance in the district's summer school programs. Graduating **eighth grade students will also turn in their iPads** as part of graduation practice as they have in past years.

New iPads will be issued to the incoming 2026-2027 kindergarten class as well as the fifth grade class. These iPads will be prepared and delivered to the classroom teachers for delivery to those students during the first week of school.

Pad Keyboards

Continuing for the 2026-2027 school year a rugged keyfolio case will be part of the deployment starting at fifth grade. That keyfolio case will roll-up with the students through eighth grade.

External keyboards purchased in previous school years will remain available for other grade levels to utilize.

At this time the District does not allow our families to provide their own keyboards for students. Due to the potential for breakages and general hardware failure it can not guarantee iPad footprints and power standards will remain the same throughout the lifespan of the student/iPad partnership.

Summer Turn-In iPads

As in past years the iPads turned in by our **4th grade and 8th grade classes will be repurposed and incorporated into our Cary 26 iPad fleet by means of**:

1. **Expanding our loaner iPad pools or replacing aging loaner iPads at each of the schools.**

   A loaner iPad is issued in cases when an iPad has to be sent out for repair. Loaner iPads are configured per student to match the configuration of the broken iPad. It is the goal for loaner iPads to provide little to no interruption to the learning process in the eyes of the student. Each school currently has a pool of iPads that are used as loaner devices.

2. **Replacing aging classroom spares is also an option.**

   Every classroom in the district has a spare iPad assigned to it with all of the apps and security of a normal student assigned iPad. A classroom spare is used if there is a minor technical problem that is being addressed within the school or if a student forgets to charge their iPad or bring it on a certain day. As in the previous school year, kindergarten, first, and second grade iPads staying at school does not eliminate the need for a classroom spare for the cases when a Technology Support Specialist needs to work on issues involving a student iPad.

3. **Looking at continuing to sell the end of life fleet to a third party** to recoup some of the costs involved with technology integration. This option is outlined in the Reselling District iPads section of this document.

iPad Leases

Beginning with the 2023-2024 Purchase Plan the District began leasing their iPads from Apple. Leasing allows the District to spread out the upfront cost of the iPads over the duration of the lease and free up the dollars that would have been used for purchasing in full front on other technology needs.

Current Apple Leases - 4 Year Terms					
Lease Year	Payment	Payment	Payment	Payment	Payment
2023-2024	$54,161.25	$54,161.25	$54,161.25 *Due 03/22/2026*	$54,161.25 *Due 03/22/2027*	
2024-2025		$53,071.13	$53,071.13 *Due 3/15/2026*	$53,071.13 *Due 3/15/2027*	$53,071.13 *Due 3/15/2027*

Purchase Plan 2025-2026 - Apple Lease						
Grade	iPads Needed (+For Enrollment Bubble)	iPad Unit Cost	Keyboards Needed (+For Enrollment Bubble)	Keyboard Unit Cost	Total Financed	Rate
KG	230	$324	0	$109.95	$74,520	
5th	280	$324	280	$109.95	$121,506	
6th	0	$324	10	$109.95	$1,099.50	
7th	0	$324	10	$109.95	$1,099.50	
	510		300		$198,225	1.9%
					$50,964.01	
				Estimated Total Cost (YR1 + YR2 + YR3):	**$158,196.39**	

Other End User Devices / Peripherals		
	QTY Purchased	**Estimated Cost**
Student iPad Cases (Kindergarten)	300	$7,785
Estimated Cost:		**$7,785**

Staff Assigned Devices

Other End User Devices / Peripherals		
	QTY Purchased	**Estimated Cost**
Staff Laptop Refresh	35	$35,000
Estimated Cost:		**$35,000**

Other Technology Advances

Infrastructure Phase 4 - Building Safety & Modernizations

Infrastructure Phase 4 is also planned for this summer as part of a large-scale building safety and modernization effort by the District. These improvements in security and communication will consist of two major components that impact technology infrastructure and will be concentrated at Deer Path for this phase. The first component focuses on modernizing our school's communication as well as safety by implementing solutions from Audio Enhancement and the second increases building security and safety through the addition of internal and external security cameras.

The Audio Enhancement rollout will consist of three key platforms and can be integrated with our current and future security camera systems for further benefits.

Audio Enhancement - Audio

This platform focuses on the audio in the classroom. As part of the Audio system, a minimum of 4 speakers will be mounted into the ceiling of each classroom. Those speakers will connect back to a control module that connects out to the microphone lanyard that the teacher wears as well as the classroom display. The sound from the teacher's voice and the

teacher's technology will now permeate the classroom instead of being focused solely in the front of the room. Some of the potential benefits of the Audio system are below.

- Teachers can reduce vocal strain
- Teachers should have fewer requests for repeated instructions
- Teachers can speak in a natural tone
- Students can have increased engagement
- Students can have improved focus
- Students can have increased comprehension
- Administrators can see increased IAR, ACCESS, ISA, and other assessment gains
- Administrators can see reduced discipline referrals

Speaking in the microphone lanyard can also provide one way translation services to a student's iPad when that service has been deemed appropriate.

Audio Enhancement - EPIC

In the late 2000's Dukane phased out its division responsible for paging and intercom systems. Thankfully stockpiles of equipment for their intercom systems were left with Dukane's many resellers and school districts across the country were able to continue to support their systems. Twenty-five years later, that supply of parts has all but dried up and maintenance has become increasingly harder to find and expensive to supply. The Audio Enhancement EPIC system replaces the obsolete Dukane intercom and bell systems in our schools. Some of the potential benefits of the EPIC system are below.

- Full-duplex audio intercom capabilities between any classroom
- Paging capabilities to any speakers in a classroom, a group of classrooms, a hallway, or external building speakers.
- Customizable bell schedules and audio alerts
- Broadcast alerts and events school-wide or to individual classrooms with robust visual messaging systems (i.e. assemblies, picture day, weather alerts or any lockdown situation.

Audio Enhancement - SAFE

The integration of the SAFE system will allow our teachers and staff wearing an Audio Enhancement lanyard to notify building administrators of a safety concern with the push of a button. This process can eliminate the need for walkie talkies broadcasting duress for all to hear and potentially escalating the situation that is occurring. Working in conjunction with the EPIC system, a SMS text or Email notification can also be automatically generated and sent to the relevant personnel for the situation once an Alert has been generated.

Security Cameras

The National Center for Education Statistics (NCES) is an agency of the Federal Government that collects, analyzes, and reports on data for schools and districts in the United States from preschool to graduate school. One of the data points that the NCES has collected is the use of security cameras in schools. NCES reports show that in 1999 only around 19% of schools in the United States used security cameras. By 2017 that number had jumped to around 83% and by 2022 it had reached 93% of schools.

The benefits of having security cameras monitoring District facilities are many and include but are not limited to the following.

- Reduction in bullying
- Reduction in violent acts
- Reduction in vandalism
- Increases in incident response time
- Increases in student and staff safety
- Improved student behaviors
- Improved visibility of facility access points
- Improved monitoring capabilities in high-risk areas

While no security camera can prevent all incidents of bullying, violence, or vandalism they are an important deterrent that impacts the likelihood of those incidents happening. Security cameras will also increase the likelihood that an offender will be caught when those incidents do unfortunately occur.

The Audio Enhancement Audio, EPIC, and SAFE systems along with the installation of security cameras require the District to begin Phase 4 of the infrastructure which is a switch fabric upgrade at the locations. This phase of the infrastructure upgrade along with items like the Audio Enhancement and security camera systems are ear marked as some of the technology components utilizing referendum dollars.

Deer Path - Infrastructure Phase 4		
	Funding Source	**Estimated Cost**
Audio Enhancement Equipment	Referendum	$353,785.27
Audio Enhancement Cabling	Referendum	$60,000
Switch Upgrade	Referendum	$206,728.22
	Estimated Cost:	**$620,513.49**

Classroom Displays

During the 2010-2011 school year the District began deploying SMART Boards and projectors to the classroom in our schools. Though labels have changed over time, the reason for that deployment was based on the same ideas outlined in the Cary Lesson Delivery Model (referred to as CLDM moving forward) found in the District's Instructional Framework. This type of classroom display is an important delivery method that can be used in teacher lead instruction, flexible small groups, collaborative learning, and independent learning phases of the gradual release model which the CLDM is based on.

Over the past 15 years technologies have advanced and student assigned devices have taken the need for SMART Boards to a minimum, but the importance of a large format classroom display is nonetheless important. A classroom display allows the District's teachers to deliver new concepts and demonstrate for their students as a whole group. Teachers can also make use of these displays when working with smaller groups of students to help facilitate understanding and provide scaffolds to student success. Students can use these displays when working with peer groups by mirroring their issued device in a larger format. This allows for higher levels of collaboration between students and allows teachers to more easily give guided instruction when required.

With the CLDM and the current deployment of student issued devices in mind, the District will begin shifting to a digital display without the interactive touch component. This new model of classroom display will not require a projector as it functions more like a modern digital sign then it does a SMART Board.

The secondary rollout of the new classroom display will go as follows.

Classroom Displays			
	Funding Source	**Quantity**	**Estimated Cost**
Deer Path	Referendum	34	$103,276.70
Three Oaks	Referendum	22	$66,826.10
		Total Estimated Cost:	$170,102.80

In subsequent years, Cary Junior High and Oak Knoll will receive new classroom displays as part of their scheduled building improvements.

Purchase Summary

The chart below is a summary of the cost being recommended for approval as part of the Technology Purchase Plan.

Cost Summary		
	Funding Source	**Estimated Cost**
iPad Lease (YR1 + YR2 + YR3)	Tech Budget	$158,196.39
Kindergarten iPad Cases	Tech Budget	$7,785
Staff Laptop Refresh	Tech Budget	$35,000
Phase 4 Infrastructure Update	Referendum	$620,513.49
Classroom Displays (Total)	Referendum	$170,102.10
	Total Estimated Cost:	**$991,596.98**

Reselling District iPads

The District will continue its relationship with Second Life Mac to purchase our retired iPad fleet. The charts below outline the grade criteria for the iPads as well as an estimated number of iPads and their associated models that the District will be looking at selling to Second Life Mac.

iPad Condition Grading and Deductions		
Grade	**Description**	**Deduction**
A	Like new condition, no blemishes	0%
B	Light signs of wear including 1 or 2 minor blemishes on the exterior of the device. LCD has no white spots.	15%
C	Normal signs of wear, including usual scratches on back of device and around all ports. Corners may have light dents and the screen may have light scratches (no deep scratches). LCD will not have any noticeable white spots.	30%
D	Heavy signs of wear including heavy scratching on the exterior of the device, dings on up to 4 corners, and deep scratches on the screen.	50%
F	Includes any non-Apple OEM installed parts, functional defects, and/or extreme cosmetic damage, such as slightly lifted screens. Defective components include, but not limited to: Screen, LCD, digitizer, buttons, speaker, microphone, headphone jack, battery, Wi-Fi, cameras, and charging port.	95%

iPad Fleet Purchase Unit Rates		
Quantity	**Unit Description**	**Estimated Return**
2	iPad Air (64GB)	$3.00
8	iPad Air 2 (64GB) Engraved	$14.00
1	iPad 5th Gen (32GB)	$44.00
2	iPad 5th Gen (128GB)	$56.00
2	iPad 6th Gen (128GB)	$66.00
598	iPad 7th Gen (32GB)	$66.00
14	iPad 8th Gen (32GB)	$76.00

** Note: The unit cost is listed assuming grade A condition of each model*

TECHNOLOGY PURCHASE PLAN

February 17, 2026

WHAT IS PEDAGOGY?

It is a dynamic and partnership-based relationship between teacher and student where both parties co-design the learning experience to achieve deep learning.

When talking about Educational Technology:

"Pedagogy is the driver – digital is the accelerator"

- Michael Fullan

FULLAN'S DEEP LEARNING DESIGN

SIX GLOBAL COMPETENCIES FOR DEEP LEARNING

Six Global Competencies for Deep Learning (New Pedagogies for Deep Learning) https://deep-learning.global	D26 Instructional Framework Classroom Culture & Environment - 2.2 Technology, Innovation, Digital Wellness
Character • Proactive stance toward life and learning to learn • Grit, tenacity, perseverance and resilience • Empathy, compassion and integrity in action	**Learning First, Technology Second** • Engagement **Empowering Responsible Digital Citizens** • Digital literacy and safety lessons **Empowering Responsible Digital Citizens** • Time management and healthy technology habits
Citizenship • A global perspective • Commitment to human equity and well-being through empathy and compassion for diverse values and world views • Genuine interest in human and environmental sustainability • Solving ambiguous and complex problems in the real world to benefit citizens	**Learning First, Technology Second** • Extension **Cultivating Innovative Thinkers** • Real-world connections **Empowering Responsible Digital Citizens** • Digital etiquette and privacy discussions
Collaboration • Working interdependently as a team • Interpersonal and team-related skills • Managing team dynamics and challenges	**Learning First, Technology Second** • Extension **Cultivating Innovative Thinkers** • Open-ended questions and collaboration

FULLAN'S DEEP LEARNING DESIGN

SIX GLOBAL COMPETENCIES FOR DEEP LEARNING

Communication • Communication designed for audience and impact • Message advocates a purpose and makes an impact • Reflection to further develop and improve communication • Voice and identity expressed to advance humanity	**Cultivating Innovative Thinkers** • Open-ended questions and collaboration **Empowering Responsible Digital Citizens** • Digital etiquette and privacy discussions
Creativity • Economic and social entrepreneurialism • Asking the right inquiry questions • Pursuing and expressing novel ideas and solutions • Leadership to turn ideas into action	**Cultivating Innovative Thinkers** • Brainstorming and design thinking challenges **Cultivating Innovative Thinkers** • Real-world connections
Critical Thinking • Evaluating information and arguments • Making connections and identifying patterns • Meaningful knowledge construction • Experimenting, reflecting and taking action on ideas in the real world	**Learning First, Technology Second** • Enhancement **Cultivating Innovative Thinkers** • Brainstorming and design thinking challenges **Cultivating Innovative Thinkers** • Open-ended questions and collaboration **Empowering Responsible Digital Citizens** • Critical thinking and online research skills

ORDER OF BUSINESS



STUDENT DEVICE MONITORING & SAFETY



2026-2027 STUDENT DEVICE ROLLOUT



STAFF ASSIGNED DEVICES & INFRASTRUCTURE PHASE 4



OTHER TECHNOLOGY ADVANCES



RESELLING DISTRICT IPADS

STUDENT DEVICE MONITORING & SAFETY

Lightspeed Systems®

- Lightspeed MDM™
- Lightspeed Filter™
- Lightspeed Alert™



Apple Classroom

SOPPA

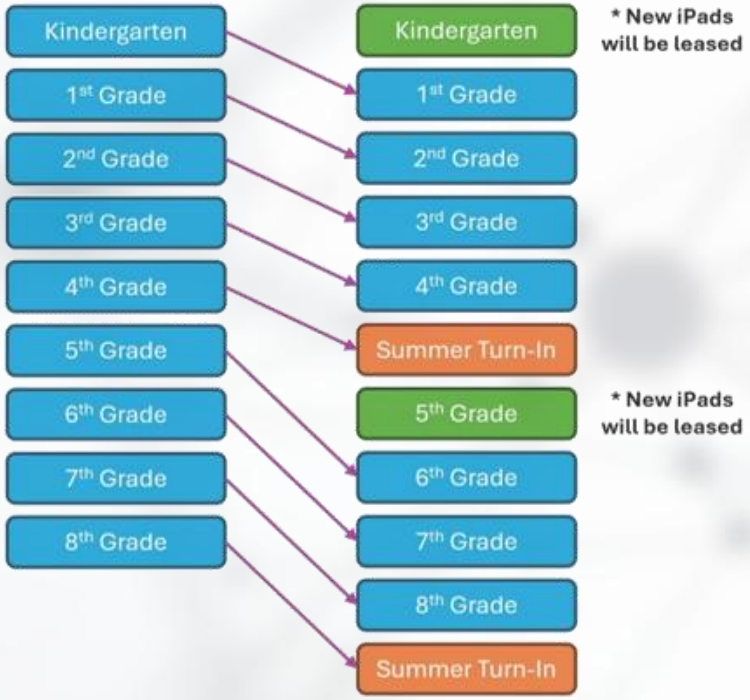
Student Online Personal Protection Act



Google API Security

2026-2027 STUDENT DEVICE ROLLOUT

GRADE LEVEL ROLLOUT



Incoming Kindergarten & 5th Grade students will receive new iPads.

Incoming 5th Grade students will receive a keyfolio case with their issued iPad

CURRENT APPLE LEASES

FINANCIAL IMPLICATIONS

Current Apple Leases - 4 Year Terms					
Lease Year	Payment	Payment	Payment	Payment	Payment
2023-2024	$54,161.25	$54,161.25	$54,161.25 *Due 03/22/2026*	$54,161.25 *Due 03/22/2027*	[redacted]
2024-2025	[redacted]	$53,071.13	$53,071.13 *Due 3/15/2026*	$53,071.13 *Due 3/15/2027*	$53,071.13 *Due 3/15/2027*

YR1 + YR2 Lease Payment: $107,232.38

2026-2027 STUDENT DEVICE ROLLOUT

FINANCIAL IMPLICATIONS

Purchase Plan 2025-2026 - Apple Lease						
Grade	iPads Needed (+For Enrollment Bubble)	iPad Unit Cost	Keyboards Needed (+For Enrollment Bubble)	Keyboard Unit Cost	Total Financed	Rate
KG	230	$324	0	$109.95	$74,520	
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7th	0	$324	10	$109.95	$1,099.50	
	510		300		$198,225	1.9%
					$50,964.01	
				Estimated Total Cost (YR1 + YR2 + YR3):	**$158,196.39**	

Other End User Devices / Peripherals		
	QTY Purchased	Estimated Cost
Student iPad Cases (Kindergarten)	300	$7,785
	Estimated Cost:	**$7,785**

Student Device Rollout Sub-Total: $165,981.39

STAFF ASSIGNED DEVICES

LAPTOP REFRESH CYCLE

Staff Laptop Refresh Cycle

- 5 Year Refresh Cycle
- 2026-2027: 35 New Laptops

Staff Laptop Refresh Sub-Total: $35,000

INFRASTRUCTURE – PHASE 4

DEER PATH – BUILDING SAFETY & MODERNIZATIONS

Deer Path

- Audio Enhancement
- Network Infrastructure Upgrades / Improvements

Deer Path security cameras are part of the approved Deer Path renovations occurring this summer. Financials not included in this plan.

BUILDING SAFETY & MODERNIZATIONS

AUDIO ENHANCEMENT - AUDIO



Benefits

- Teachers can reduce vocal strain
- Teachers should have fewer requests for repeated instructions
- Teachers can speak in a natural tone
- Students can have increased engagement
- Students can have improved focus
- Students can have increased comprehension
- Administrators can see increased IAR, ACCESS, ISA, and other assessment gains
- Administrators can see reduced discipline referrals

BUILDING SAFETY & MODERNIZATIONS

AUDIO ENHANCEMENT - EPIC



Benefits

- Full-duplex audio intercom capabilities between any classroom
- Paging capabilities to any speakers in a classroom, a group of classrooms, a hallway, or external building speakers.
- Customizable bell schedules and audio alerts
- Broadcast alerts and events school-wide or to individual classrooms with robust visual messaging systems (i.e. assemblies, picture day, weather alerts or any lockdown situation.

BUILDING SAFETY & MODERNIZATIONS

AUDIO ENHANCEMENT - SAFE



Benefits

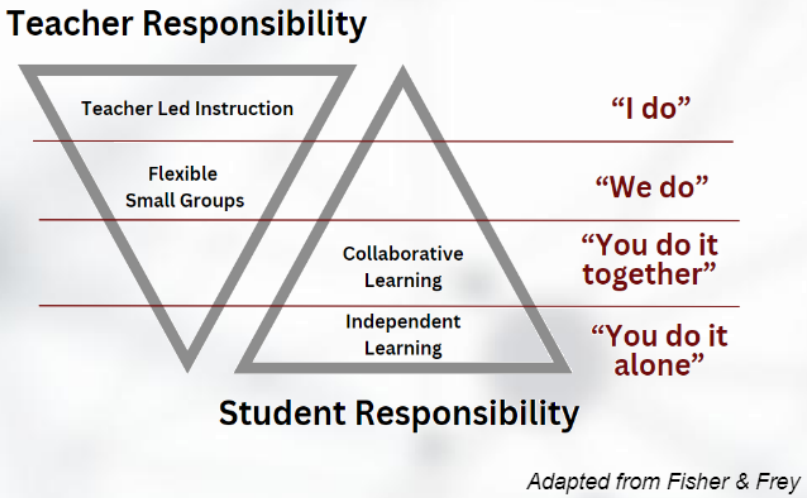
- The integration of the SAFE system will allow our teachers and staff wearing an Audio Enhancement lanyard to notify building administrators of a safety concern with the push of a button.
- Working in conjunction with the EPIC system, a SMS text or Email notification can also be automatically generated and sent to the relevant personnel for the situation once an Alert has been generated.

INFRASTRUCTURE – PHASE 4

DEER PATH – BUILDING SAFETY & MODERNIZATIONS

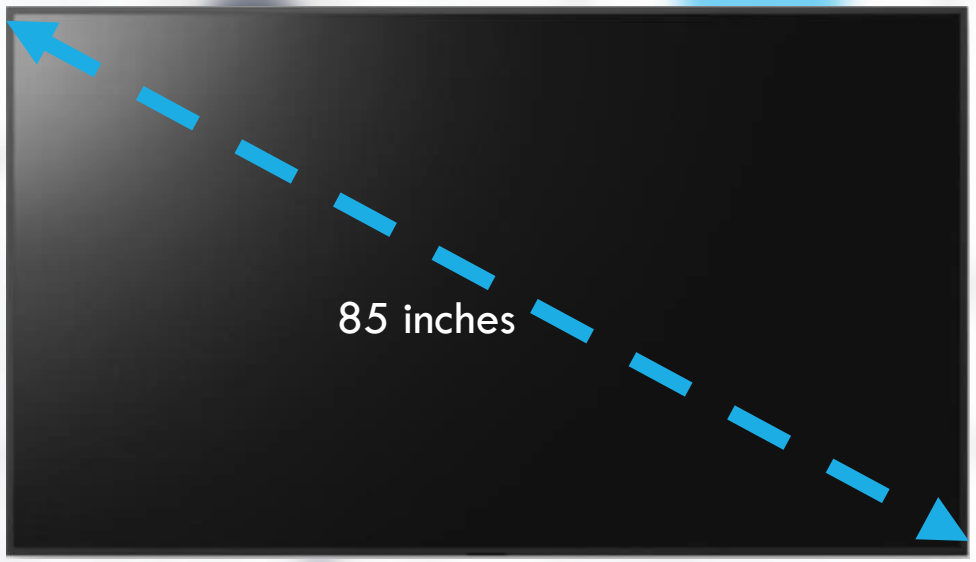
Deer Path - Infrastructure Phase 4		
	Funding Source	Estimated Cost
Audio Enhancement Equipment	Referendum	$353,785.27
Audio Enhancement Cabling	Referendum	$60,000
Switch Upgrade	Referendum	$206,728.22
	Estimated Cost:	**$620,513.49**

CLASSROOM DISPLAYS



Sony Bravia Professional Display (Instructional)

- Can be used in Teacher Led Instruction
- Flexible Small Groups
- Collaborative Learning



Sony Bravia Professional Display (Physical)

- Eliminates SMART Board
- Eliminates Projector
- Eliminates SMART Audio
- Eliminates Control Box
- Laptop connects via HDMI
- AirPlay for iPad mirroring built-in

CLASSROOM DISPLAYS

Classroom Displays			
	Funding Source	Quantity	Estimated Cost
Deer Path	Referendum	34	$103,276.70
Three Oaks	Referendum	22	$66,826.10
		Total Estimated Cost:	$170,102.80

In subsequent years, Cary Junior High and Oak Knoll will receive new classroom displays as part of their scheduled building improvements.

RESELLING DISTRICT IPADS

iPad Condition Grading and Deductions		
Grade	**Description**	**Deduction**
A	Like new condition, no blemishes	0%
B	Light signs of wear including 1 or 2 minor blemishes on the exterior of the device. LCD has no white spots.	15%
C	Normal signs of wear, including usual scratches on back of device and around all ports. Corners may have light dents and the screen may have light scratches (no deep scratches). LCD will not have any noticeable white spots.	30%
D	Heavy signs of wear including heavy scratching on the exterior of the device, dings on up to 4 corners, and deep scratches on the screen.	50%
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iPad Fleet Purchase Unit Rates		
Quantity	**Unit Description**	**Estimated Return**
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1	iPad 5th Gen (32GB)	$44.00
2	iPad 5th Gen (128GB)	$56.00
2	iPad 6th Gen (128GB)	$66.00
598	iPad 7th Gen (32GB)	$66.00
14	iPad 8th Gen (32GB)	$76.00

** Note: The unit cost is listed assuming grade A condition of each model*

Maximum Potential Value: $40,938

SUMMARY OF PURCHASES

Cost Summary		
	Funding Source	Estimated Cost
iPad Lease (YR1 + YR2 + YR3)	Tech Budget	$158,196.39
Kindergarten iPad Cases	Tech Budget	$7,785
Staff Laptop Refresh	Tech Budget	$35,000
Phase 4 Infrastructure Update	Referendum	$620,513.49
Classroom Displays (Total)	Referendum	$170,102.10
	Total Estimated Cost:	**$991,596.98**

QUESTIONS?



Cashman Stahler Group

February 17, 2026

Mr. David Shepherd
Cary Community Consolidated School District 26
2115 Crystal Lake Road
Cary, IL 60013

Renovations and Improvements 2026
Deer Path Elementary School
Three Oaks Elementary School
CSG840

Dear Mr. Shepherd,

Bid Proposals for the Renovations and Improvements 2026 project were received and publicly opened on February 10, 2026. Eight (8) General Contractors requested bid documents and a total of three (3) of these plan holders submitted a Bid Proposal.

The attached Bid Tabulation itemizes the Bid Proposals received for the project.

CSG contacted Tyler Lane Construction to review their bid proposal and their qualifications in more detail. In addition to reviewing this documentation, CSG had subsequent conversations and reviewed additional bid proposal and qualification documentation Tyler Lane Construction was requested to provide. Based on the information provided, we confirm their Bid Proposal appears to be complete and responsive.

The Bid Documents included Alternate Bid Number One for the complete removal and replacement of the Three Oaks Elementary School courtyard window and door openings.

It is our recommendation that the district accepts the Tyler Lane Construction's Proposal in the amount of $10,615,119 which includes the Base Bid and Alternate Bid Number One lump sums.

Sincerely

Gregory M. Stahler
Cashman Stahler Group

BID TABULATION SHEET

Project Number: CSG840
Project: Deer Path / Three Oaks School Renovations

Date: February 10, 2026
Time: 2:00 P.M.
Location: Cary SD26

BIDDING INFORMATION							BASE BID	ALTERNATE ONE	TOTAL
BIDDERS	INFO			ADDENDUM RECEIPT					
	QUAL	BOND	CK	1	2				
Boller Construction Waukegan, IL	X	X		X	X		$10,729,300	$341,300	$11,070,600
Carmichael Construction							NO BID		
Kandu Construction							NO BID		
Manusos General Contracting Fox Lake, IL	X	X		X	X		$11,043,177	$310,000	$11,353,177
Path Construction Company							NO BID		
Sollitt Construction							NO BID		
Tyler Lane Construction Rosemont, IL	**X**	**X**		**X**	**X**		**$10,269,621**	**$345,498**	**$10,615,119**
Wm. Tonyan & Son.							NO BID		

SECTION0 000300 - BID FORM

BID DUE DATE: February 10, 2026

BID TO: **Cary Community Consolidated School District 26**
2115 Crystal Lake Road
Cary, Illinois 60013

BID FROM: Tyler Lane Construction Inc.
6250 N. River Rd.
Suite 5050
Rosemont, IL 60018

BID FOR: **Renovations and Improvements**

Deer Path Elementary School
2211 Crystal Lake Road
Cary, Illinois 60013

Three Oaks School
1514 Three Oaks Road
Cary, Illinois 60013

ARCHITECT'S
PROJECT NO.: **CSG840**

The Undersigned Acknowledges Receipt of:

Bid Documents for the work indicated above, including the Project Manual and Drawings and all addenda listed below:

Addenda: No. 1, dated 1.30.2026
No. 2, dated 2.06.2026
No. _____, dated _____
No. _____, dated _____
No. _____, dated _____
No. _____, dated _____

(Failure to acknowledge all addendum on the Bid Form may subject the Bidder to disqualification.)

Having examined the site of the work, and having familiarized himself or herself with local conditions and existing site conditions affecting the cost of the work and with all requirements of the bidding documents including the Project Manual, Invitation to Bid, Instructions to Bidders, Supplementary

Instructions to Bidders, General Conditions, Supplementary Conditions, Specifications, Drawings, and duly issued Addenda, hereby agrees to perform all work and furnish all labor, material and equipment specifically required by the Bidding Documents, exclusive of alternate bids.

The Undersigned Agrees:

To furnish and/or install the described material and/or services for stated lump sum price and unit prices.

To hold this base bid and alternate bids open until sixty (60) calendar days after the bid opening date.

To accept the provisions of the Bid Form, Invitation to Bid, Bid Notice, Instructions to Bidders, Supplementary Instructions to Bidders, General Conditions, Supplementary Conditions, Specifications, Drawings, Addenda, and disposition of bid security.

To enter into and execute a contract with the Owner, if awarded on the basis of this bid, and in connection therewith to:

1. Furnish all bonds and insurance required by the Bidding Documents and as defined in the Supplementary Conditions.
2. Accomplish the work in accordance with the Contract.
3. Complete all required work by the completion date(s) and in accordance with the schedule specified in the Bidding Documents.
4. To pay liquidated damages (if specified) if the Bidder fails to complete all necessary work by the established completion date(s).

Bid Deposit:

The undersigned furnishes herewith, as required in the Instructions to Bidders, a **bid deposit in the amount of 10%** of the amount bid.

Bidder to check form of deposit furnished below:

_____ Cashier's Check

_____ Certified Check made payable to the Owner

__X__ Bid Bond naming the Owner as obligee

It is understood and agreed that should the undersigned fail to enter into a contract with the Owner or furnish acceptable contract security within the time and in the manner specified, the bid deposit shall be retained by the Owner as liquidated damages and not as a forfeiture. As it is impossible to determine precisely an exact amount of damages the Owner will sustain, it is agreed that the bid deposit is a fair and equitable estimate of such damages.

Start Dates/Completion Dates:

The Owner will not be responsible for any additional costs due to the Contractor or Subcontractors for performing work on evenings, weekends, or holidays in order to complete the work of the Contract Documents on or before the required substantial completion date(s) or final completion date(s) specified in this Bid Form and agreed to by the Bidder.

Submittal Dates: The undersigned agrees to begin preparation of all submittals immediately upon receipt of a Notice to Proceed and to issue a submittal schedule and / or begin issuance of the submittals within fifteen (15) business days of receipt of a fully executed Contract.

Commencement Date: The undersigned agrees to begin work immediately upon receipt of the Owner's Notice To Proceed. It is the District's intention to issue a Notice to Proceed no later than **February 25, 2026.**

Substantial Completion Date: The Contractor agrees to have the work substantially complete for unobstructed Owner Occupancy of all project areas **on or before August 7, 2026.** (Liquidated Damages are associated with this Completion Date.)

Final Completion Date: The Contractor agrees to have the scope of work complete and all Punch List items completely within thrity (3) days of issuance of the final punch list. After the commencement of student attendance, all incomplete work will be performed during non-student attendance hours or non-school attendance days.

Completion Dates:

The undersigned agrees to provide the level of manpower required to complete all necessary work associated with the Substantial Completion of the Base Bid and all Alternate Bid Scope of Work for Owner occupancy for the above noted Base Bid Lump Sum amount on or before the Substantial Completion and Final Completion Date(s).

The undersigned agrees to the assessment of liquidated damages for each calendar day the work is not substantially complete after the substantial completion date.

Liquidated Damages:

For each and every calendar day the work or any portion or the work remains incomplete after the expiration of the time limits and/or completion dates set forth in the Contract documents, the Owner will access liquidated damages. The amount per calendar day indicated in the AIA A201 General Conditions will be deducted from the money due or to become due to the Contractor, not as a penalty, but as liquidated damages and added expense including administrative and inspection cost.

Liquidated Damages in the amount of **One Thousand Dollars ($1,000.00)** per day per project site will be assessed for every calendar day the work is not Substantially Complete on or before the **Substantial Completion Date of August 7, 2026**.

Base Bid :

For providing all work, including any respective allowances, as required for performing all the Base Bid Scope of Work as shown on the drawings and described in the specifications.

Base Bid Lump Sum of:

Ten Million Two Hundred Sixty Nine Thousand Six Hundred Twenty One **Dollars (** $ 10,269,621 **).**

(Include Owner's Contingency Allowances and value of each Product Allowance in the Base Lump Sum.)

Base Bid Schedule of Values

Complete the following Schedule of Values totaling the amount of the base bid indicated above. Break costs down into line items following the format indicated. The base bid schedule of values will provide the Owner with documentation essential for the prompt comparison and evaluation of the bids. FAILURE TO COMPLETE THE SCHEDULE MAY BE GROUNDS FOR REJECTION OF THE BID PROPOSAL.

BASE BID SCHEDULE OF VALUES				
	Section	**Section Title / Description of Work**	**Cost**	
Division 00	ALL	General Conditions / Overhead and Profit	$	584,810
Division 01	ALL	General Requirements	$	150,360
	012100	Allowance No. 1 - General Construction	$	120,000
	012100	Allowance No. 2 - Roofing Contractor	$	20,000
	012100	Allowance No. 3 - Door Hardware	$	240,000
	012100	Allowance No. 4 - Wireless Door Hardware	$	280,000
	012100	Allowance No. 5 - Wireless Integration	$	170,000
	012100	Allowance No. 6 - Sound System	$	50,000
	012100	Allowance No. 7 - New Flooring	$	70,000
	012100	Product Allowance No, 8 - Sprinkler Heads	$	10,875
	012100	Product Allowance No. 9 - Receptacle Plates	$	10,000
	012100	Product Allowance No. 10 - Visual Display	$	12,325
Division 02	ALL	Existing Conditions	$	332,605
Division 03 - 07	ALL	All Sections	$	382,270
Division 08		Openings	$	1,011,232
Division 09 - 10	ALL	Finishes / Specialties	$	1,853,008

BASE BID SCHEDULE OF VALUES				
Division 12	ALL	Furnishing	$	482,942
Division 22	ALL	Plumbing	$	466,537
Division 23	ALL	Mechanical	$	1,029,000
Division 26-28	ALL	Electrical	$	2,993,657
		Base Bid Grand Total (Must match Base Bid Lump Sum amount)	$	10,269,621

Alternate Bid Number One (1) - Courtyard Window Replacement (Three Oaks School)

ADD a lump sum of:

Three Hundred Forty-Five Thousand Four Hundred Ninety-Eight **Dollars (** $ 345,498 **).**
(This Alternate Bid is an ADD ALTERNATE and IS NOT INCLUDED in the Base Bid lump sum)

Contractor Proposed Alternates and Substitutes:

The following is a list of bidder or contractor proposed alternate and substitute products. The bidder understands that acceptance or rejection of any substitution listed below is the option of the Owner. Proposed alternates or substitutes will not be used by the Owner for determining the lowest responsible bid but may be used by the Owner as part of the overall Bid consideration process.

If additional space is required, attach a separate list and indicate such attachment by checking this space: _____.

Work Specified	Contractor Proposed Alternate	Change in Base Bid

Bid Acceptance:

If written notice of the acceptance of this bid is mailed, telegraphed, faxed or delivered to the undersigned within the time noted herein, after the date of opening of bids or at any time thereafter before this bid is withdrawn, the undersigned agrees that he or she will execute a construction contract (AIA Document A101, current edition) in accordance with the bids as accepted. He or she will obtain performance and payment bonds with such surety or sureties as the Owner may approve cost of which shall be included in the base bid.

The Owner reserves the right to award the contract to its best interests, to reject any or all bids, to waive any informalities in bidding and to hold all bids for the bid guarantee period. The Owner reserves the right to award separate contracts for any of the items of work bid herein.

Representations and Certifications:

The bidder makes the following representations and certifications as part of his bid on the project herein identified in the Bid Form. In the case of a joint venture bid, each party represents and certifies as to his own organization.

SURETY. I have notified a Surety Company that I am submitting a bid for work to be performed on the project. The Surety Company has agreed to issue a performance and labor and material payment bond for my work if my bid is accepted and the contract awarded to me.

AVAILABILITY. The number and amount of contracts and awards pending which I am and/or will be obligated to perform, now and during the course of the project, will not interfere with or hinder the timely prosecution of my work.

INDEPENDENT PRICE DETERMINATION. The contract sum in this bid has been arrived at independently, without consultation, communication or agreement for the purpose of restricting competition.

PREVAILING WAGE. The contractor and each subcontractor shall pay not less than the general prevailing rate of hourly wages for work of a similar character in the locality in which the work is performed and not less than general prevailing rate of hourly wages for legal holidays and overtime work in the performance of work under this contract, as established by the Illinois Department of Labor, pursuant to an act of the General Assembly of the State of Illinois approved June 26, 1941 as amended according to the Illinois Revised Statutes, Chapter 48, Section 39s-1, et seq.

Pursuant to Illinois Revised Statutes, Chapter 48, Section 39s-5, the contractor and each subcontractor shall keep an accurate record showing the names and occupation of all laborers, workers and mechanics employed by them, and also showing the actual hourly wages paid to each such individual, which record shall be open at all reasonable hours to inspection by the Owner, its officers and agents, and to agents of the Illinois Department of Labor.

The contractor and each subcontractor hereby agree, jointly and severally, to defend, indemnify and hold harmless the Owner and Architect from any and all claims, demands, liens or suits of any kind or nature whatsoever (including suits for injunctive relief) by the Illinois Department of Labor under the Illinois Prevailing Wage Act, Illinois Revised Statutes, Chapter 48, Section 39s-1, et seq., or by any laborer, worker or mechanic employed by the contractor or the subcontractor who alleges that he has been paid for his services in a sum less than prevailing wage rates required by Illinois law. The Owner agrees to notify the contractor or subcontractor of the pendency of any such claim, demand, lien or suit.

BID-RIGGING/BID ROTATING. The undersigned is not barred from bidding on this project as a result of a violation of either Section 33E-3 (Bid-rigging) or Section 38E-4 (Bid rotating) under Article 33E of Chapter 38 of the Illinois Revised Statutes.

Signature:

The undersigned respectfully submitted this 10th day,

in the month of February, 2026.

Type of Firm (Bidder to indicate)

_____ Individual

_____ Partnership

__X__ Corporation

_____ Joint Venture

Tyler Lane Construction Inc.
(Firm Name)

6250 N. River Rd., Suite 5050

Rosemont, IL 60018
(Address)

(AFFIX CORPORATE SEAL)

773.588.4500
(Telephone Number)

Larry Vacala
(Authorized Bidder's Name)

(Authorized Bidder's Signature)

President
(Title)

Subscribed and sworn to me this 10th day of February, 2026.

Notary Signature: _____

Official Seal
M Usdrowski
Notary Public State of Illinois
Commission Expires 03/17/2025

Marie Usdrowski
(Printed Name)

(AFFIX NOTARY SEAL)

END OF SECTION 000300

SECTION0 000300 - BID FORM

BID DUE DATE: 2/10/26

BID TO: **Cary Community Consolidated School District 26**
2115 Crystal Lake Road
Cary, Illinois 60013

BID FROM: Boller Construction Company Inc

3045 Washington Street

Waukegan, Il 60085

BID FOR: **Renovations and Improvements**

Deer Path Elementary School
2211 Crystal Lake Road
Cary, Illinois 60013

Three Oaks School
1514 Three Oaks Road
Cary, Illinois 60013

ARCHITECT'S
PROJECT NO.: **CSG840**

The Undersigned Acknowledges Receipt of:

Bid Documents for the work indicated above, including the Project Manual and Drawings and all addenda listed below:

Addenda: No. 1, dated 1/30/26

No. 2, dated 2/6/26

No. _____, dated _____

No. _____, dated _____

No. _____, dated _____

No. _____, dated _____

(Failure to acknowledge all addendum on the Bid Form may subject the Bidder to disqualification.)

Having examined the site of the work, and having familiarized himself or herself with local conditions and existing site conditions affecting the cost of the work and with all requirements of the bidding documents including the Project Manual, Invitation to Bid, Instructions to Bidders, Supplementary

Instructions to Bidders, General Conditions, Supplementary Conditions, Specifications, Drawings, and duly issued Addenda, hereby agrees to perform all work and furnish all labor, material and equipment specifically required by the Bidding Documents, exclusive of alternate bids.

The Undersigned Agrees:

To furnish and/or install the described material and/or services for stated lump sum price and unit prices.

To hold this base bid and alternate bids open until sixty (60) calendar days after the bid opening date.

To accept the provisions of the Bid Form, Invitation to Bid, Bid Notice, Instructions to Bidders, Supplementary Instructions to Bidders, General Conditions, Supplementary Conditions, Specifications, Drawings, Addenda, and disposition of bid security.

To enter into and execute a contract with the Owner, if awarded on the basis of this bid, and in connection therewith to:

1. Furnish all bonds and insurance required by the Bidding Documents and as defined in the Supplementary Conditions.
2. Accomplish the work in accordance with the Contract.
3. Complete all required work by the completion date(s) and in accordance with the schedule specified in the Bidding Documents.
4. To pay liquidated damages (if specified) if the Bidder fails to complete all necessary work by the established completion date(s).

Bid Deposit:

The undersigned furnishes herewith, as required in the Instructions to Bidders, a **bid deposit in the amount of 10%** of the amount bid.

Bidder to check form of deposit furnished below:

_____ Cashier's Check

_____ Certified Check made payable to the Owner

__X__ Bid Bond naming the Owner as obligee

It is understood and agreed that should the undersigned fail to enter into a contract with the Owner or furnish acceptable contract security within the time and in the manner specified, the bid deposit shall be retained by the Owner as liquidated damages and not as a forfeiture. As it is impossible to determine precisely an exact amount of damages the Owner will sustain, it is agreed that the bid deposit is a fair and equitable estimate of such damages.

Start Dates/Completion Dates:

The Owner will not be responsible for any additional costs due to the Contractor or Subcontractors for performing work on evenings, weekends, or holidays in order to complete the work of the Contract Documents on or before the required substantial completion date(s) or final completion date(s) specified in this Bid Form and agreed to by the Bidder.

Submittal Dates: The undersigned agrees to begin preparation of all submittals immediately upon receipt of a Notice to Proceed and to issue a submittal schedule and / or begin issuance of the submittals within fifteen (15) business days of receipt of a fully executed Contract.

Commencement Date: The undersigned agrees to begin work immediately upon receipt of the Owner's Notice To Proceed. It is the District's intention to issue a Notice to Proceed no later than **February 25, 2026.**

Substantial Completion Date: The Contractor agrees to have the work substantially complete for unobstructed Owner Occupancy of all project areas **on or before August 7, 2026.** (Liquidated Damages are associated with this Completion Date.)

Final Completion Date: The Contractor agrees to have the scope of work complete and all Punch List items completely within thrity (3) days of issuance of the final punch list. After the commencement of student attendance, all incomplete work will be performed during non-student attendance hours or non-school attendance days.

Completion Dates:

The undersigned agrees to provide the level of manpower required to complete all necessary work associated with the Substantial Completion of the Base Bid and all Alternate Bid Scope of Work for Owner occupancy for the above noted Base Bid Lump Sum amount on or before the Substantial Completion and Final Completion Date(s).

The undersigned agrees to the assessment of liquidated damages for each calendar day the work is not substantially complete after the substantial completion date.

Liquidated Damages:

For each and every calendar day the work or any portion or the work remains incomplete after the expiration of the time limits and/or completion dates set forth in the Contract documents, the Owner will access liquidated damages. The amount per calendar day indicated in the AIA A201 General Conditions will be deducted from the money due or to become due to the Contractor, not as a penalty, but as liquidated damages and added expense including administrative and inspection cost.

Liquidated Damages in the amount of **One Thousand Dollars ($1,000.00)** per day per project site will be assessed for every calendar day the work is not Substantially Complete on or before the **Substantial Completion Date of August 7, 2026**.

Base Bid :

For providing all work, including any respective allowances, as required for performing all the Base Bid Scope of Work as shown on the drawings and described in the specifications.

Base Bid Lump Sum of:

Ten million Seven hundred Twenty-Nine thousand Three hundred **Dollars ($** 10,729,300 **).**

(Include Owner's Contingency Allowances and value of each Product Allowance in the Base Bid Lump Sum.)

Base Bid Schedule of Values

Complete the following Schedule of Values totaling the amount of the base bid indicated above. Break costs down into line items following the format indicated. The base bid schedule of values will provide the Owner with documentation essential for the prompt comparison and evaluation of the bids. FAILURE TO COMPLETE THE SCHEDULE MAY BE GROUNDS FOR REJECTION OF THE BID PROPOSAL.

BASE BID SCHEDULE OF VALUES			
	Section	**Section Title / Description of Work**	**Cost**
Division 00	ALL	General Conditions / Overhead and Profit	833,400
Division 01	ALL	General Requirements	250,000
	012100	Allowance No. 1 - General Construction	$120,000
	012100	Allowance No. 2 - Roofing Contractor	$20,000
	012100	Allowance No. 3 - Door Hardware	$240,000
	012100	Allowance No. 4 - Wireless Door Hardware	$280,000
	012100	Allowance No. 5 - Wireless Integration	$170,000
	012100	Allowance No. 6 - Sound System	$50,000
	012100	Allowance No. 7 - New Flooring	$70,000
	012100	Product Allowance No, 8 - Sprinkler Heads	$11,500
	012100	Product Allowance No. 9 - Receptacle Plates	$10,000
	012100	Product Allowance No. 10 - Visual Display	$12,400
Division 02	ALL	Existing Conditions	$556,000
Division 03 - 07	ALL	All Sections	$956,000
Division 08		Openings	950,000
Division 09 - 10	ALL	Finishes / Specialties	$1,740,000

BASE BID SCHEDULE OF VALUES			
	Section	**Section Title / Description of Work**	**Cost**
Division 12	ALL	Furnishing	260,000
Division 22	ALL	Plumbing	400,000
Division 23	ALL	Mechanical	1,000,000
Division 26-28	ALL	Electrical	2,800,000
		Base Bid Grand Total (Must match Base Bid Lump Sum amount)	10,729,300

Alternate Bid Number One (1) - Courtyard Window Replacement (Three Oaks School)

ADD a lump sum of:

Three hundred Forty-one thousand Three hundred **Dollars ($**341,300**).**

(This Alternate Bid is an ADD ALTERNATE and IS NOT INCLUDED in the Base Bid lump sum)

Contractor Proposed Alternates and Substitutes:

The following is a list of bidder or contractor proposed alternate and substitute products. The bidder understands that acceptance or rejection of any substitution listed below is the option of the Owner. Proposed alternates or substitutes will not be used by the Owner for determining the lowest responsible bid but may be used by the Owner as part of the overall Bid consideration process.

If additional space is required, attach a separate list and indicate such attachment by checking this space: _____.

Work Specified	**Contractor Proposed Alternate**	**Change in Base Bid**

Bid Acceptance:

If written notice of the acceptance of this bid is mailed, telegraphed, faxed or delivered to the undersigned within the time noted herein, after the date of opening of bids or at any time thereafter before this bid is withdrawn, the undersigned agrees that he or she will execute a construction contract (AIA Document A101, current edition) in accordance with the bids as accepted. He or she will obtain performance and payment bonds with such surety or sureties as the Owner may approve cost of which shall be included in the base bid.

The Owner reserves the right to award the contract to its best interests, to reject any or all bids, to waive any informalities in bidding and to hold all bids for the bid guarantee period. The Owner reserves the right to award separate contracts for any of the items of work bid herein.

Representations and Certifications:

The bidder makes the following representations and certifications as part of his bid on the project herein identified in the Bid Form. In the case of a joint venture bid, each party represents and certifies as to his own organization.

SURETY. I have notified a Surety Company that I am submitting a bid for work to be performed on the project. The Surety Company has agreed to issue a performance and labor and material payment bond for my work if my bid is accepted and the contract awarded to me.

AVAILABILITY. The number and amount of contracts and awards pending which I am and/or will be obligated to perform, now and during the course of the project, will not interfere with or hinder the timely prosecution of my work.

INDEPENDENT PRICE DETERMINATION. The contract sum in this bid has been arrived at independently, without consultation, communication or agreement for the purpose of restricting competition.

PREVAILING WAGE. The contractor and each subcontractor shall pay not less than the general prevailing rate of hourly wages for work of a similar character in the locality in which the work is performed and not less than general prevailing rate of hourly wages for legal holidays and overtime work in the performance of work under this contract, as established by the Illinois Department of Labor, pursuant to an act of the General Assembly of the State of Illinois approved June 26, 1941 as amended according to the Illinois Revised Statutes, Chapter 48, Section 39s-1, et seq.

Pursuant to Illinois Revised Statutes, Chapter 48, Section 39s-5, the contractor and each subcontractor shall keep an accurate record showing the names and occupation of all laborers, workers and mechanics employed by them, and also showing the actual hourly wages paid to each such individual, which record shall be open at all reasonable hours to inspection by the Owner, its officers and agents, and to agents of the Illinois Department of Labor.

The contractor and each subcontractor hereby agree, jointly and severally, to defend, indemnify and hold harmless the Owner and Architect from any and all claims, demands, liens or suits of any kind or nature whatsoever (including suits for injunctive relief) by the Illinois Department of Labor under the Illinois Prevailing Wage Act, Illinois Revised Statutes, Chapter 48, Section 39s-1, et seq., or by any laborer, worker or mechanic employed by the contractor or the subcontractor who alleges that he has been paid for his services in a sum less than prevailing wage rates required by Illinois law. The Owner agrees to notify the contractor or subcontractor of the pendency of any such claim, demand, lien or suit.

BID-RIGGING/BID ROTATING. The undersigned is not barred from bidding on this project as a result of a violation of either Section 33E-3 (Bid-rigging) or Section 38E-4 (Bid rotating) under Article 33E of Chapter 38 of the Illinois Revised Statutes.

Signature:

The undersigned respectfully submitted this 16th day,

in the month of Feb, 2026

Type of Firm (Bidder to indicate)

_____ Individual

_____ Partnership

__X__ Corporation

_____ Joint Venture

Boller Construction Company Inc
(Firm Name)

3045 Washington Street

Waukegan, IL 60085
(Address)

847-662-5566
(Telephone Number)

Joshua Boller
(Authorized Bidder's Name)

(Authorized Bidder's Signature)

President
(Title)

(AFFIX CORPORATE SEAL)

Boller Construction Company, Inc. CORPORATE SEAL Illinois

Subscribed and sworn to me this 10 day of Feb, 2026

Notary Signature: _____

Gabriela D Lanza
(Printed Name)

(AFFIX NOTARY SEAL)

OFFICIAL SEAL
GABRIELA D LANZA
NOTARY PUBLIC, STATE OF ILLINOIS
COMMISSION NO. 988383
MY COMMISSION EXPIRES MARCH 16, 2028

END OF SECTION 000300

SECTION0 000300 - BID FORM

BID DUE DATE: February 10, 2026

BID TO: **Cary Community Consolidated School District 26**
2115 Crystal Lake Road
Cary, Illinois 60013

BID FROM: Manusos General Contracting, Inc.

91 Christopher Way

Fox Lake IL 60020

847-973-0600

BID FOR: **Renovations and Improvements**

Deer Path Elementary School
2211 Crystal Lake Road
Cary, Illinois 60013

Three Oaks School
1514 Three Oaks Road
Cary, Illinois 60013

ARCHITECT'S
PROJECT NO.: **CSG840**

The Undersigned Acknowledges Receipt of:

Bid Documents for the work indicated above, including the Project Manual and Drawings and all addenda listed below:

Addenda: No. 1, dated 1/30/26

No. 2, dated 2/6/26

No. _____, dated _____

No. _____, dated _____

No. _____, dated _____

No. _____, dated _____

(Failure to acknowledge all addendum on the Bid Form may subject the Bidder to disqualification.)

Having examined the site of the work, and having familiarized himself or herself with local conditions and existing site conditions affecting the cost of the work and with all requirements of the bidding documents including the Project Manual, Invitation to Bid, Instructions to Bidders, Supplementary

Instructions to Bidders, General Conditions, Supplementary Conditions, Specifications, Drawings, and duly issued Addenda, hereby agrees to perform all work and furnish all labor, material and equipment specifically required by the Bidding Documents, exclusive of alternate bids.

The Undersigned Agrees:

To furnish and/or install the described material and/or services for stated lump sum price and unit prices.

To hold this base bid and alternate bids open until sixty (60) calendar days after the bid opening date.

To accept the provisions of the Bid Form, Invitation to Bid, Bid Notice, Instructions to Bidders, Supplementary Instructions to Bidders, General Conditions, Supplementary Conditions, Specifications, Drawings, Addenda, and disposition of bid security.

To enter into and execute a contract with the Owner, if awarded on the basis of this bid, and in connection therewith to:

1. Furnish all bonds and insurance required by the Bidding Documents and as defined in the Supplementary Conditions.
2. Accomplish the work in accordance with the Contract.
3. Complete all required work by the completion date(s) and in accordance with the schedule specified in the Bidding Documents.
4. To pay liquidated damages (if specified) if the Bidder fails to complete all necessary work by the established completion date(s).

Bid Deposit:

The undersigned furnishes herewith, as required in the Instructions to Bidders, a **bid deposit in the amount of 10%** of the amount bid.

Bidder to check form of deposit furnished below:

_____ Cashier's Check

_____ Certified Check made payable to the Owner

X_____ Bid Bond naming the Owner as obligee

It is understood and agreed that should the undersigned fail to enter into a contract with the Owner or furnish acceptable contract security within the time and in the manner specified, the bid deposit shall be retained by the Owner as liquidated damages and not as a forfeiture. As it is impossible to determine precisely an exact amount of damages the Owner will sustain, it is agreed that the bid deposit is a fair and equitable estimate of such damages.

Start Dates/Completion Dates:

The Owner will not be responsible for any additional costs due to the Contractor or Subcontractors for performing work on evenings, weekends, or holidays in order to complete the work of the Contract Documents on or before the required substantial completion date(s) or final completion date(s) specified in this Bid Form and agreed to by the Bidder.

Submittal Dates: The undersigned agrees to begin preparation of all submittals immediately upon receipt of a Notice to Proceed and to issue a submittal schedule and / or begin issuance of the submittals within fifteen (15) business days of receipt of a fully executed Contract.

Commencement Date: The undersigned agrees to begin work immediately upon receipt of the Owner's Notice To Proceed. It is the District's intention to issue a Notice to Proceed no later than **February 25, 2026.**

Substantial Completion Date: The Contractor agrees to have the work substantially complete for unobstructed Owner Occupancy of all project areas **on or before August 7, 2026.** (Liquidated Damages are associated with this Completion Date.)

Final Completion Date: The Contractor agrees to have the scope of work complete and all Punch List items completely within thrity (3) days of issuance of the final punch list. After the commencement of student attendance, all incomplete work will be performed during non-student attendance hours or non-school attendance days.

Completion Dates:

The undersigned agrees to provide the level of manpower required to complete all necessary work associated with the Substantial Completion of the Base Bid and all Alternate Bid Scope of Work for Owner occupancy for the above noted Base Bid Lump Sum amount on or before the Substantial Completion and Final Completion Date(s).

The undersigned agrees to the assessment of liquidated damages for each calendar day the work is not substantially complete after the substantial completion date.

Liquidated Damages:

For each and every calendar day the work or any portion or the work remains incomplete after the expiration of the time limits and/or completion dates set forth in the Contract documents, the Owner will access liquidated damages. The amount per calendar day indicated in the AIA A201 General Conditions will be deducted from the money due or to become due to the Contractor, not as a penalty, but as liquidated damages and added expense including administrative and inspection cost.

Liquidated Damages in the amount of **One Thousand Dollars ($1,000.00)** per day per project site will be assessed for every calendar day the work is not Substantially Complete on or before the **Substantial Completion Date of August 7, 2026**.

Base Bid :

For providing all work, including any respective allowances, as required for performing all the Base Bid Scope of Work as shown on the drawings and described in the specifications.

Base Bid Lump Sum of: Eleven Millron Forty three Thousand One Hundred Seventy-seven **Dollars ($** 11,043,177.00 **).**
(Include Owner's Contingency Allowances and value of each Product Allowance in the Base Bid Lump Sum.)

Base Bid Schedule of Values

Complete the following Schedule of Values totaling the amount of the base bid indicated above. Break costs down into line items following the format indicated. The base bid schedule of values will provide the Owner with documentation essential for the prompt comparison and evaluation of the bids.
FAILURE TO COMPLETE THE SCHEDULE MAY BE GROUNDS FOR REJECTION OF THE BID PROPOSAL.

BASE BID SCHEDULE OF VALUES			
	Section	**Section Title / Description of Work**	**Cost**
Division 00	ALL	General Conditions / Overhead and Profit	1,338,171.00
Division 01	ALL	General Requirements	
	012100	Allowance No. 1 - General Construction	$120,000
	012100	Allowance No. 2 - Roofing Contractor	$20,000
	012100	Allowance No. 3 - Door Hardware	$240,000
	012100	Allowance No. 4 - Wireless Door Hardware	$280,000
	012100	Allowance No. 5 - Wireless Integration	$170,000
	012100	Allowance No. 6 - Sound System	$50,000
	012100	Allowance No. 7 - New Flooring	$70,000
	012100	Product Allowance No, 8 - Sprinkler Heads	11,000.00
	012100	Product Allowance No. 9 - Receptacle Plates	11,500.00
	012100	Product Allowance No. 10 - Visual Display	34,000.00
Division 02	ALL	Existing Conditions	391,169.00
Division 03 - 07	ALL	All Sections	~~[illegible]~~ 325,695.00 BS
Division 08		Openings	872,390.00
Division 09 - 10	ALL	Finishes / Specialties	1,793,915.00

BASE BID SCHEDULE OF VALUES			
	Section	**Section Title / Description of Work**	**Cost**
Division 12	ALL	Furnishing	$20,000.00
Division 22	ALL	Plumbing	411,880.00
Division 23	ALL	Mechanical	1,399,800.00
Division 26-28	ALL	Electrical	2,983,657.00
		Base Bid Grand Total (Must match Base Bid Lump Sum amount)	11,043,177.00

Alternate Bid Number One (1) - Courtyard Window Replacement (Three Oaks School)

ADD a lump sum of:

Three Hundred Ten Thousand **Dollars ($** 310,000.00 **).**

(This Alternate Bid is an ADD ALTERNATE and IS NOT INCLUDED in the Base Bid lump sum)

Contractor Proposed Alternates and Substitutes: N/A

The following is a list of bidder or contractor proposed alternate and substitute products. The bidder understands that acceptance or rejection of any substitution listed below is the option of the Owner. Proposed alternates or substitutes will not be used by the Owner for determining the lowest responsible bid but may be used by the Owner as part of the overall Bid consideration process.

If additional space is required, attach a separate list and indicate such attachment by checking this space: _____.

Work Specified	**Contractor Proposed Alternate**	**Change in Base Bid**

Bid Acceptance:

If written notice of the acceptance of this bid is mailed, telegraphed, faxed or delivered to the undersigned within the time noted herein, after the date of opening of bids or at any time thereafter before this bid is withdrawn, the undersigned agrees that he or she will execute a construction contract (AIA Document A101, current edition) in accordance with the bids as accepted. He or she will obtain performance and payment bonds with such surety or sureties as the Owner may approve cost of which shall be included in the base bid.

The Owner reserves the right to award the contract to its best interests, to reject any or all bids, to waive any informalities in bidding and to hold all bids for the bid guarantee period. The Owner reserves the right to award separate contracts for any of the items of work bid herein.

Representations and Certifications:

The bidder makes the following representations and certifications as part of his bid on the project herein identified in the Bid Form. In the case of a joint venture bid, each party represents and certifies as to his own organization.

SURETY. I have notified a Surety Company that I am submitting a bid for work to be performed on the project. The Surety Company has agreed to issue a performance and labor and material payment bond for my work if my bid is accepted and the contract awarded to me.

AVAILABILITY. The number and amount of contracts and awards pending which I am and/or will be obligated to perform, now and during the course of the project, will not interfere with or hinder the timely prosecution of my work.

INDEPENDENT PRICE DETERMINATION. The contract sum in this bid has been arrived at independently, without consultation, communication or agreement for the purpose of restricting competition.

PREVAILING WAGE. The contractor and each subcontractor shall pay not less than the general prevailing rate of hourly wages for work of a similar character in the locality in which the work is performed and not less than general prevailing rate of hourly wages for legal holidays and overtime work in the performance of work under this contract, as established by the Illinois Department of Labor, pursuant to an act of the General Assembly of the State of Illinois approved June 26, 1941 as amended according to the Illinois Revised Statutes, Chapter 48, Section 39s-1, et seq.

Pursuant to Illinois Revised Statutes, Chapter 48, Section 39s-5, the contractor and each subcontractor shall keep an accurate record showing the names and occupation of all laborers, workers and mechanics employed by them, and also showing the actual hourly wages paid to each such individual, which record shall be open at all reasonable hours to inspection by the Owner, its officers and agents, and to agents of the Illinois Department of Labor.

The contractor and each subcontractor hereby agree, jointly and severally, to defend, indemnify and hold harmless the Owner and Architect from any and all claims, demands, liens or suits of any kind or nature whatsoever (including suits for injunctive relief) by the Illinois Department of Labor under the Illinois Prevailing Wage Act, Illinois Revised Statutes, Chapter 48, Section 39s-1, et seq., or by any laborer, worker or mechanic employed by the contractor or the subcontractor who alleges that he has been paid for his services in a sum less than prevailing wage rates required by Illinois law. The Owner agrees to notify the contractor or subcontractor of the pendency of any such claim, demand, lien or suit.

BID-RIGGING/BID ROTATING. The undersigned is not barred from bidding on this project as a result of a violation of either Section 33E-3 (Bid-rigging) or Section 38E-4 (Bid rotating) under Article 33E of Chapter 38 of the Illinois Revised Statutes.

Signature:

The undersigned respectfully submitted this 10th day,

in the month of February, 20 26.

Type of Firm (Bidder to indicate)

_____ Individual

_____ Partnership

X Corporation

_____ Joint Venture

Manusos General Contracting, Inc.
(Firm Name)

91 Christopher Way

Fox Lake IL 60020
(Address)

(AFFIX CORPORATE SEAL)

847-973-0600
(Telephone Number)

Jamie L. McKeown
(Authorized Bidder's Name)

(Authorized Bidder's Signature)

Executive Vice President
(Title)

Subscribed and sworn to me this 10th day of February, 2026.

Notary Signature: Gina Huber

OFFICIAL SEAL
GINA ELIZABETH HUBER
NOTARY PUBLIC, STATE OF ILLINOIS
COMMISSION NO. 1014139
MY COMMISSION EXPIRES JULY 23, 2029

Gina Huber
(Printed Name)

(AFFIX NOTARY SEAL)

END OF SECTION 000300

Project Manual

Project Name:

Renovations and Improvements

Architect's Project Number: CSG840

Project Location:

Deer PathElementary School
2211 Crystal Lake Road
Cary, Illinois 60013

Three Oaks School
1514 Three Oaks Road
Cary, Illinois 60013

Owner:

Cary Community Consolidated School District 26

2115 Crystal Lake Road
Cary, Illinois 60013

Issue:

Issued For Bidding
January 13, 2025

Cashman Stahler Group

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SECTION 000030 - INVITATION TO BID

Project:

CSG840 Renovations and Improvements

Location:

Deer Path Elementary School
2211 Crystal Lake Road
Cary, IL 60013

Three Oaks Elementary School
1514 Three Oaks Road
Cary, IL 60013

Owner:

Cary Community Consolidated School District 26
2115 Crystal Lake Road
Cary, Illinois 60013

Architect:

Cashman Stahler Group, Inc.
1910 S. Highland Avenue, Suite 310
Lombard, Illinois 60148

General Project Description:

The Scope of Work includes providing all labor, materials, machinery, tools, equipment and other means of construction necessary for selective interior renovations and improvements at Deer Path Elementary School and Three Oaks Elementary School, as indicated in the Bid Documents.

Refer to the Contract Documents for additional information related to the Scope of Work associated with this Contract.

Bid Proposal Due Dates:

Bid Proposal Submission: Bid Proposals will be received by the Owner at the place, date and time stated below.

Place: Administration Center
Cary Community Consolidated School District 26
2115 Crystal Lake Road
Cary, Illinois 60013

Date: **Tuesday, February 10, 2026**

Time: **2:00 P.M. Local Time**

Bid Proposal Opening: Bids proposals will be publicly opened and read at the place, date and time stated below.

Place: Administration Center
Cary Community Consolidated School District 26
2115 Crystal Lake Road
Cary, Illinois 60013

Date: **Tuesday, February 10, 2026**

Time: **2:00 P.M. Local Time**

Any proposals received after the time and date stated above may, at the Owner's discretion, be returned to the Bidder unopened. In addition, any proposals received from a Contractor that did not attend any mandatory pre-bid meeting scheduled for this project may, at the Owner's discretion, be returned to the Bidder unopened.

Bid Proposals Requirements:

All bid proposals must contain the following bid documentation:

Bid Envelopes:

All sealed proposals must contain the following information on the outside of the sealed envelope:

- Project Name
- Bidder's Company Name
- Place, date and time of bid opening

Bid Form: A complete, fully executed Bid Form, including all blank lines filled in and signed and notorized.

Bid Security: Bid security in the form of a certified check, cashier's check, or bid bond made payable to Cary Community Consolidated School District 26 in an amount equal to ten percent (10%) of the base bid is required of all parties submitting a proposal.

Contractor's Qualification Statement: A completed Qualification Statement, AIA Document A305 included in the Project Manual. (Form NOT included as part of the Bid Documents.)

Certification of Non-Collusion: Fully executed copy of the Certification of Non-Collusion form included as part of the Bid Documents.

Bid Documents:

Electronic format (PDF) Bid Documents will be issued to all Prospective Bidders by contacting the individual listed below **via email**.

Mr. Greg Stahler
Cashman Stahler Group.
1910 S. Highland Avenue, Suite 310
Lombard, Illinois 60048
Email: gstahler@cashmanstahler.com

Mandatory Pre-Bid Meeting:

A Mandatory Pre-Bid Meeting will be held at **2:00 P.M., Tuesday, January 20, 2026**, at the Distirct Administrative Center, 2115 Crystal Lake Road, in Cary Illinois. The Bidder is required to attend the Mandatory Pre-Bid Meeting and to visit the project site prior to submission of a Bid Proposal. Failure to attend the meeting and visit the project sites may be grounds for rejection of the Bid Proposal.

Bidder Questions:

Contractor, subcontractor and supplier questions that arise during bidding should be directed to the District Architect, Greg Stahler at Cashman Stahler Group **via email** at gstahler@cashmanstahler.com to assure proper receipt, response and documentation of all inquires.

Field Verification:

Field verification of the existing conditions is required prior to submission of a bid. The project site may be visited in conjunction with a Pre-Bid Meeting and/or by making prior arrangements with Cary Community Consolidated School District 26 by contacting the following individual:

Mr. David Martin - Operations Coordinator
Cary Community Consolidated School District 26
Administration Center
2115 Crystal Lake Road
Poplar Grove, IL 61065
Telephone: (224) 357-5100
Email: dmartin@cary26.org

Owner’s Rights:

The Owner reserves the right to accept or reject any and all bids, and to waive informalities to any bid when such is deemed by the Owner to be in the Owner's best interest.

This invitation is issued in the name of Cary Community Consolidated School District 26.

END OF SECTION 000030

SECTION 000035 - BID NOTICE

NOTICE TO BIDDERS
FOR CARY COMMUNITY CONSOLIDATED SCHOOL DISTRICT 26

The following bid notice was published by Cary Community Consolidated School District 26:

The Cary Community Consolidated School District 26 Board of Education is accepting bids for renovations and improvements to the Deer Path Elementary School and Three Oaks Elementary School.

- **PROJECT DESCRIPTION**

  The Scope of Work generally includes providing all labor, materials, machinery, tools, equipment and other means of construction necessary for mechanical, electrical and plumbing improvements, interior renovations, restroom renovation, replacement of existing flooring, and casework, ceiling and lighting replacement, and replacement of exterior and interior doors, frames and hardware.

  PROJECT SCHEDULE

  The work is to be performed at Deer Path Elementary School and Three Oaks Elementary School in Cary, Illinois. Work is scheduled to take place from **June 2026 through August 2026.**

  Complete sets of the Bid Documents may be obtained beginning **January 13, 2026** from the District's Architect, Cashman Stahler Group, Inc. by emailing a request to Gregory Stahler at gstahler@cashmanstahler.com. Bid Documents will be made available to all Bidders who confirm they meet or exceed the District's bid qualifications.

  A Mandatory Pre-Bid meeting will be held at **2:00 P.M., Tuesday, January 20, 2026**, at the District Administrative Center, 2115 Crystal Lake Road, in Cary, Illinois. A bidder's failure to attend the Mandatory Pre-Bid meeting may be, at the Owner's discretion, grounds for rejection of the Contractor's Bid.

  The public bid opening is at **2:00 P.M., Tuesday, February 10, 2026,** in the District Administrative Center located at 2115 Crystal Lake Road, Cary, Illinois. Prior to the public bid opening, sealed bids will be received by **2:00 P.M., Tuesday, February 10, 2026,** at the District Administrative Center.

  Each bid submission must include a **Bid Form**, **Certification of Non-Collusion**, **Bid Security** in the amount of ten percent (10%) of the base bid, a fully executed **Contractor Qualification Statement (AIA Form A305)**, and all requested documentation confirming the Contractor meets all District bid qualifications. The successful Bidder will be required to furnish construction performance and payment bonds in the full amount of the contract.

  The Cary Community Consolidated School District 26 Board of Education is not obligated to accept the lowest or any other bid and reserves the right to reject any and all bids, to waive any informalities and irregularities in bidding procedures and to award the contract to the lowest responsible bidder, or to accept any bid that in it's sole opinion best serves the interests of the School District, as determined by the District.

END OF SECTION 000035

AIA® Document A701® – 2018

Instructions to Bidders

for the following Project:
(Name, location, and detailed description)

Renovations and Improvements 2026
Deer Path Elementary School
2211 Crystal Lake Road
Cary, Illinois 60013

Three Oaks Elementary School
1514 Three Oaks Road
Cary, Illinois 60013

THE OWNER:
(Name, legal status, address, and other information)

Cary Community Consolidated School District 26
2115 Crystal Lake Road
Cary, IL 60013

THE ARCHITECT:
(Name, legal status, address, and other information)

Cashman Stahler Group
1910 South Highland Avenue, Suite 310
Lombard, IL 60148

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2 BIDDER'S REPRESENTATIONS

3 BIDDING DOCUMENTS

4 BIDDING PROCEDURES

5 CONSIDERATION OF BIDS

6 POST-BID INFORMATION

7 PERFORMANCE BOND AND PAYMENT BOND

8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

ADDITIONS AND DELETIONS:
The author of this document may have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

FEDERAL, STATE, AND LOCAL LAWS MAY IMPOSE REQUIREMENTS ON PUBLIC PROCUREMENT CONTRACTS. CONSULT LOCAL AUTHORITIES OR AN ATTORNEY TO VERIFY REQUIREMENTS APPLICABLE TO THIS PROCUREMENT BEFORE COMPLETING THIS FORM.

It is intended that AIA Document G612™–2017, Owner's Instructions to the Architect, Parts A and B will be completed prior to using this document.

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User Notes: (69672476af564537371ce7de)

ARTICLE 1 DEFINITIONS

§ 1.1 Bidding Documents include the Bidding Requirements and the Proposed Contract Documents. The Bidding Requirements consist of the advertisement or invitation to bid, Instructions to Bidders, supplementary instructions to bidders, the bid form, and any other bidding forms. The Proposed Contract Documents consist of the unexecuted form of Agreement between the Owner and Contractor and that Agreement's Exhibits, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, all Addenda, and all other documents enumerated in Article 8 of these Instructions.

§ 1.2 Definitions set forth in the General Conditions of the Contract for Construction, or in other Proposed Contract Documents apply to the Bidding Documents.

§ 1.3 Addenda are written or graphic instruments issued by the Architect, which, by additions, deletions, clarifications, or corrections, modify or interpret the Bidding Documents.

§ 1.4 A Bid is a complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.

§ 1.5 The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents, to which Work may be added or deleted by sums stated in Alternate Bids.

§ 1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from, or that does not change, the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.

§ 1.7 A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, as described in the Bidding Documents.

§ 1.8 A Bidder is a person or entity who submits a Bid and who meets the requirements set forth in the Bidding Documents.

§ 1.9 A Sub-bidder is a person or entity who submits a bid to a Bidder for materials, equipment, or labor for a portion of the Work.

ARTICLE 2 BIDDER'S REPRESENTATIONS

§ 2.1 By submitting a Bid, the Bidder represents that:

- **.1** the Bidder has read and understands the Bidding Documents;
- **.2** the Bidder understands how the Bidding Documents relate to other portions of the Project, if any, being bid concurrently or presently under construction;
- **.3** the Bid complies with the Bidding Documents;
- **.4** the Bidder has visited the site, become familiar with local conditions under which the Work is to be performed, and has correlated the Bidder's observations with the requirements of the Proposed Contract Documents;
- **.5** the Bid is based upon the materials, equipment, and systems required by the Bidding Documents without exception; and
- **.6** the Bidder has read and understands the provisions for liquidated damages, if any, set forth in the form of Agreement between the Owner and Contractor.

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 Distribution

§ 3.1.1 Bidders shall obtain complete Bidding Documents, as indicated below, from the issuing office designated in the advertisement or invitation to bid, for the deposit sum, if any, stated therein.
(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall obtain Bidding Documents.)

Issued via email from Cashman Stahler Group.

§ 3.1.2 Any required deposit shall be refunded to Bidders who submit a bona fide Bid and return the paper Bidding Documents in good condition within ten days after receipt of Bids. The cost to replace missing or damaged paper documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the paper Bidding Documents, and the Bidder's deposit will be refunded.

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User Notes: (69672476af564537371ce7de)

§ 3.1.3 Bidding Documents will not be issued directly to Sub-bidders unless specifically offered in the advertisement or invitation to bid, or in supplementary instructions to bidders.

§ 3.1.4 Bidders shall use complete Bidding Documents in preparing Bids. Neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete Bidding Documents.

§ 3.1.5 The Bidding Documents will be available for the sole purpose of obtaining Bids on the Work. No license or grant of use is conferred by distribution of the Bidding Documents.

§ 3.2 Modification or Interpretation of Bidding Documents

§ 3.2.1 The Bidder shall carefully study the Bidding Documents, shall examine the site and local conditions, and shall notify the Architect of errors, inconsistencies, or ambiguities discovered and request clarification or interpretation pursuant to Section 3.2.2.

§ 3.2.2 Requests for clarification or interpretation of the Bidding Documents shall be submitted by the Bidder in writing and shall be received by the Architect at least seven days prior to the date for receipt of Bids.
(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall submit requests for clarification and interpretation.)

Bidder questions shall be issued in writing to the Architect via email.

§ 3.2.3 Modifications and interpretations of the Bidding Documents shall be made by Addendum. Modifications and interpretations of the Bidding Documents made in any other manner shall not be binding, and Bidders shall not rely upon them.

§ 3.3 Substitutions

§ 3.3.1 The materials, products, and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution.

§ 3.3.2 Substitution Process

§ 3.3.2.1 Written requests for substitutions shall be received by the Architect at least ten days prior to the date for receipt of Bids. Requests shall be submitted in the same manner as that established for submitting clarifications and interpretations in Section 3.2.2.

§ 3.3.2.2 Bidders shall submit substitution requests on a Substitution Request Form if one is provided in the Bidding Documents.

§ 3.3.2.3 If a Substitution Request Form is not provided, requests shall include (1) the name of the material or equipment specified in the Bidding Documents; (2) the reason for the requested substitution; (3) a complete description of the proposed substitution including the name of the material or equipment proposed as the substitute, performance and test data, and relevant drawings; and (4) any other information necessary for an evaluation. The request shall include a statement setting forth changes in other materials, equipment, or other portions of the Work, including changes in the work of other contracts or the impact on any Project Certifications (such as LEED), that will result from incorporation of the proposed substitution.

§ 3.3.3 The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

§ 3.3.4 If the Architect approves a proposed substitution prior to receipt of Bids, such approval shall be set forth in an Addendum. Approvals made in any other manner shall not be binding, and Bidders shall not rely upon them.

§ 3.3.5 No substitutions will be considered after the Contract award unless specifically provided for in the Contract Documents.

§ 3.4 Addenda

§ 3.4.1 Addenda will be transmitted to Bidders known by the issuing office to have received complete Bidding Documents.
(Indicate how, such as by email, website, host site/platform, paper copy, or other method Addenda will be transmitted.)

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Addenda will be issued via email to all plan holders issued Bid Documents.

§ 3.4.2 Addenda will be available where Bidding Documents are on file.

§ 3.4.3 Addenda will be issued no later than four days prior to the date for receipt of Bids, except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids.

§ 3.4.4 Prior to submitting a Bid, each Bidder shall ascertain that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid.

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 Preparation of Bids

§ 4.1.1 Bids shall be submitted on the forms included with or identified in the Bidding Documents.

§ 4.1.2 All blanks on the bid form shall be legibly executed. Paper bid forms shall be executed in a non-erasable medium.

§ 4.1.3 Sums shall be expressed in both words and numbers, unless noted otherwise on the bid form. In case of discrepancy, the amount entered in words shall govern.

§ 4.1.4 Edits to entries made on paper bid forms must be initialed by the signer of the Bid.

§ 4.1.5 All requested Alternates shall be bid. If no change in the Base Bid is required, enter "No Change" or as required by the bid form.

§ 4.1.6 Where two or more Bids for designated portions of the Work have been requested, the Bidder may, without forfeiture of the bid security, state the Bidder's refusal to accept award of less than the combination of Bids stipulated by the Bidder. The Bidder shall neither make additional stipulations on the bid form nor qualify the Bid in any other manner.

§ 4.1.7 Each copy of the Bid shall state the legal name and legal status of the Bidder. As part of the documentation submitted with the Bid, the Bidder shall provide evidence of its legal authority to perform the Work in the jurisdiction where the Project is located. Each copy of the Bid shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further name the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached, certifying the agent's authority to bind the Bidder.

§ 4.1.8 A Bidder shall incur all costs associated with the preparation of its Bid.

§ 4.2 Bid Security

§ 4.2.1 Each Bid shall be accompanied by the following bid security:
(Insert the form and amount of bid security.)

Bid Bond in the amount of ten percent (10) of the total value of the Base Bid Lump Sum,

§ 4.2.2 The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and shall, if required, furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds if required, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty. In the event the Owner fails to comply with Section 6.2, the amount of the bid security shall not be forfeited to the Owner.

§ 4.2.3 If a surety bond is required as bid security, it shall be written on AIA Document A310™, Bid Bond, unless otherwise provided in the Bidding Documents. The attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of an acceptable power of attorney. The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 4.2.4 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until (a) the Contract has been executed and bonds, if required, have been furnished; (b) the specified time has elapsed so that Bids may be withdrawn; or (c) all Bids have been rejected. However, if no Contract has been awarded or a Bidder has not been notified of the acceptance of its Bid, a Bidder may, beginningthirty (30) days after the opening of Bids, withdraw its Bid

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and request the return of its bid security.

§ 4.3 Submission of Bids

§ 4.3.1 A Bidder shall submit its Bid as indicated below:
(Indicate how, such as by website, host site/platform, paper copy, or other method Bidders shall submit their Bid.)

Bid Proposals shall be delivered mailed, messenger, or hand delivered in a sealed envelope.

§ 4.3.2 Paper copies of the Bid, the bid security, and any other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall be addressed to the party receiving the Bids and shall be identified with the Project name, the Bidder's name and address, and, if applicable, the designated portion of the Work for which the Bid is submitted. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof.

§ 4.3.3 Bids shall be submitted by the date and time and at the place indicated in the invitation to bid. Bids submitted after the date and time for receipt of Bids, or at an incorrect place, will not be accepted.

§ 4.3.4 The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

§ 4.3.5 A Bid submitted by any method other than as provided in this Section 4.3 will not be accepted.

§ 4.4 Modification or Withdrawal of Bid

§ 4.4.1 Prior to the date and time designated for receipt of Bids, a Bidder may submit a new Bid to replace a Bid previously submitted, or withdraw its Bid entirely, by notice to the party designated to receive the Bids. Such notice shall be received and duly recorded by the receiving party on or before the date and time set for receipt of Bids. The receiving party shall verify that replaced or withdrawn Bids are removed from the other submitted Bids and not considered. Notice of submission of a replacement Bid or withdrawal of a Bid shall be worded so as not to reveal the amount of the original Bid.

§ 4.4.2 Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids in the same format as that established in Section 4.3, provided they fully conform with these Instructions to Bidders. Bid security shall be in an amount sufficient for the Bid as resubmitted.

§ 4.4.3 After the date and time designated for receipt of Bids, a Bidder who discovers that it made a clerical error in its Bid shall notify the Architect of such error within two days, or pursuant to a timeframe specified by the law of the jurisdiction where the Project is located, requesting withdrawal of its Bid. Upon providing evidence of such error to the reasonable satisfaction of the Architect, the Bid shall be withdrawn and not resubmitted. If a Bid is withdrawn pursuant to this Section 4.4.3, the bid security will be attended to as follows:
(State the terms and conditions, such as Bid rank, for returning or retaining the bid security.)

Bid security may, at the Owner's discretion, be returned to the Bidder.

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 Opening of Bids

If stipulated in an advertisement or invitation to bid, or when otherwise required by law, Bids properly identified and received within the specified time limits will be publicly opened and read aloud. A summary of the Bids may be made available to Bidders.

§ 5.2 Rejection of Bids

Unless otherwise prohibited by law, the Owner shall have the right to reject any or all Bids.

§ 5.3 Acceptance of Bid (Award)

§ 5.3.1 It is the intent of the Owner to award a Contract to the lowest responsive and responsible Bidder, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents. Unless otherwise prohibited by law, the Owner shall have the right to waive informalities and irregularities in a Bid received and to accept the Bid which, in the Owner's judgment, is in the Owner's best interests.

§ 5.3.2 Unless otherwise prohibited by law, the Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the lowest responsive

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and responsible Bidder on the basis of the sum of the Base Bid and Alternates accepted.

ARTICLE 6 POST-BID INFORMATION

§ 6.1 Contractor's Qualification Statement

Bidders to whom award of a Contract is under consideration shall submit to the Architect, upon request and within the timeframe specified by the Architect, a properly executed AIA Document A305™, Contractor's Qualification Statement, unless such a Statement has been previously required and submitted for this Bid.

§ 6.2 Owner's Financial Capability

A Bidder to whom award of a Contract is under consideration may request in writing, fourteen days prior to the expiration of the time for withdrawal of Bids, that the Owner furnish to the Bidder reasonable evidence that financial arrangements have been made to fulfill the Owner's obligations under the Contract. The Owner shall then furnish such reasonable evidence to the Bidder no later than seven days prior to the expiration of the time for withdrawal of Bids. Unless such reasonable evidence is furnished within the allotted time, the Bidder will not be required to execute the Agreement between the Owner and Contractor.

§ 6.3 Submittals

§ 6.3.1 After notification of selection for the award of the Contract, the Bidder shall, as soon as practicable or as stipulated in the Bidding Documents, submit in writing to the Owner through the Architect:

.1 a designation of the Work to be performed with the Bidder's own forces;

.2 names of the principal products and systems proposed for the Work and the manufacturers and suppliers of each; and

.3 names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work.

§ 6.3.2 The Bidder will be required to establish to the satisfaction of the Architect and Owner the reliability and responsibility of the persons or entities proposed to furnish and perform the Work described in the Bidding Documents.

§ 6.3.3 Prior to the execution of the Contract, the Architect will notify the Bidder if either the Owner or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Architect has reasonable objection to a proposed person or entity, the Bidder may, at the Bidder's option, withdraw the Bid or submit an acceptable substitute person or entity. The Bidder may also submit any required adjustment in the Base Bid or Alternate Bid to account for the difference in cost occasioned by such substitution. The Owner may accept the adjusted bid price or disqualify the Bidder. In the event of either withdrawal or disqualification, bid security will not be forfeited.

§ 6.3.4 Persons and entities proposed by the Bidder and to whom the Owner and Architect have made no reasonable objection must be used on the Work for which they were proposed and shall not be changed except with the written consent of the Owner and Architect.

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 Bond Requirements

§ 7.1.1 If stipulated in the Bidding Documents, the Bidder shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder.

§ 7.1.2 If the furnishing of such bonds is stipulated in the Bidding Documents, the cost shall be included in the Bid. If the furnishing of such bonds is required after receipt of bids and before execution of the Contract, the cost of such bonds shall be added to the Bid in determining the Contract Sum.

§ 7.1.3 The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 7.1.4 Unless otherwise indicated below, the Penal Sum of the Payment and Performance Bonds shall be the amount of the Contract Sum.
(If Payment or Performance Bonds are to be in an amount other than 100% of the Contract Sum, indicate the dollar amount or percentage of the Contract Sum.)

§ 7.2 Time of Delivery and Form of Bonds

§ 7.2.1 The Bidder shall deliver the required bonds to the Owner not later than three days following the date of execution

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of the Contract. If the Work is to commence sooner in response to a letter of intent, the Bidder shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished and delivered in accordance with this Section 7.2.1.

§ 7.2.2 Unless otherwise provided, the bonds shall be written on AIA Document A312, Performance Bond and Payment Bond.

§ 7.2.3 The bonds shall be dated on or after the date of the Contract.

§ 7.2.4 The Bidder shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix to the bond a certified and current copy of the power of attorney.

ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

§ 8.1 Copies of the proposed Contract Documents have been made available to the Bidder and consist of the following documents:

.1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)

Not Applicable

.2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)

Not Applicable

.3 AIA Document A201™–2017, General Conditions of the Contract for Construction, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)

.4 Building Information Modeling Exhibit, if completed:

Not Applicable

.5 Drawings

Number	Title	Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda:

Number	Date	Pages

.8 Other Exhibits:
(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

[ ] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017.)

[ ] The Sustainability Plan:

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Title	Date	Pages

[ ] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.9 Other documents listed below:
(List here any additional documents that are intended to form part of the Proposed Contract Documents.)

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Additions and Deletions Report for
AIA® Document A701® – 2018

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 23:17:32 CST on 01/14/2026.

Changes to original AIA text

There are no edits to the original text

Variable Information

PAGE 1

Renovations and Improvements 2026

Deer Path Elementary School
2211 Crystal Lake Road
Cary, Illinois 60013

Three Oaks Elementary School
1514 Three Oaks Road
Cary, Illinois 60013

Cary Community Consolidated School District 26

2115 Crystal Lake Road
Cary, IL 60013

Cashman Stahler Group

1910 South Highland Avenue, Suite 310
Lombard, IL 60148

PAGE 2

Issued via email from Cashman Stahler Group.

PAGE 3

Bidder questions shall be issued in writing to the Architect via email.

PAGE 4

Addenda will be issued via email to all plan holders issued Bid Documents.

Bid Bond in the amount of ten percent (10) of the total value of the Base Bid Lump Sum,

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§ 4.2.4 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until (a) the Contract has been executed and bonds, if required, have been furnished; (b) the specified time has elapsed so that Bids may be withdrawn; or (c) all Bids have been rejected. However, if no Contract has been awarded or a Bidder has not been notified of the acceptance of its Bid, a Bidder may, beginning
thirty (30)
days after the opening of Bids, withdraw its Bid and request the return of its bid security.

PAGE 5

Bid Proposals shall be delivered mailed, messenger, or hand delivered in a sealed envelope.

Bid security may, at the Owner's discretion, be returned to the Bidder.

PAGE 7

Not Applicable

Not Applicable

Not Applicable

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SECTION 000120 - SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL

The following requirements modify the "Instructions to Bidders" AIA Document A701. Where a portion of the Instructions to Bidders is modified or deleted by these Supplementary Instructions to Bidders, the unaltered portions of the Instructions to Bidders will remain in effect.

ARTICLE 2 BIDDER'S REPRESENTATION

2.1.5 The Bidder shall fully investigate and document existing buildings and site elements that will impact the proposed scope of work. The act of submitting a bid is to be considered full acknowledgment that the Bidder has inspected the site, has thoroughly reviewed the Contract Documents, is completely familiar with the exposed and concealed existing conditions and their impact of the new work, and has fully planned the integration of the new construction Scope of Work requirements with existing conditions.

2.1.6 If after inspecting the entire project area, a Bidder believes they still do not have a complete understanding of the existing conditions they would encounter during the project, the District may allow the Bidder to cut, upon written request, access openings in existing construction to allow the Bidder to fully ascertain the required Scope of Work.

2.1.7 The Bidder understands no change orders for additional cost will be allowed for a contractor’s discovery of existing conditions, that in the Architect’s and Owner’s opinion, the contractor should have made themselves aware of through a thorough site investigation prior to bid submission and, if necessary, selective exploratory demolition and cutting.

2.1.8 The Bidder shall pay prevailing wages in accordance with current rates determined by the Illinois Department of Labor whether using union workers or non-union workers. Failure of a Contractor’s workers or subcontractors to cross a union picket line or informational picket line will not relieve the Contractor of their contractual obligations to complete the work in accordance with the Construction Schedule.

ARTICLE 3 BIDDING DOCUMENTS

3.1.5 The Bidder must submit the Contractor’s Qualification Statement, AIA A305, to the Owner for review as part of the Bidding Documents. The Bidder must include with the Contractor's Qualification Statement, the following information:

.1 Bidder shall have the appropriate bonding capacity to bond 100 percent of its proposed contract amount, as required by these Contract Documents. The bonding company must be licensed in the State of Illinois.

.2 The Bidder must have a minimum of five (5) years’ experience in Illinois public school construction. The Bidder will provide a summary of all Illinois public school work completed in the last five (5) years. For each project, include the name and dollar value of the school project and the names and telephone numbers of the Owner and Architect.

.3 The Bidder shall have successfully completed at least five (5) comparable Illinois public school renovations projects of similar or larger cost, scope and size in the last five (5) years. The Bidder shall submit a list of references for the five (5) comparable school construction projects. (Estimated project cost $5,000,000 to $6,000,000. Approximate project scope 60,000 SF.)

.4 The Bidder submitting the actual Bid shall have their own place of business, equipment, staff, manpower, etc., required for the type of work they are licensed to perform.

.5 The Bidder shall be able to meet the necessary insurance coverage limits required by the Contract Documents. The insurance company shall be acceptable to the District and shall comply with the applicable rating requirements.

.6 If requested, the Bidder shall provide the necessary financial information to the District, including, but not limited to, the financial statements for the three (3) previous years.

.7 Bidder shall submit a list of all penalties or liquidated damages incurred by the Bidder's organization in the last five (5) years.

.8 List all projects the Bidder's organization has completed in the last five (5) years, giving the name of the project, owner, architect, contract amount, scheduled and actual date of substantial completion, scheduled and actual date of final completion, and percentage of work performed by the Bidder's own forces.

.9 Resume of all key personnel (i.e., Principal, Project Manager, Superintendent(s)) to be assigned to the project.

.10 Bidders shall submit to the District a complete list of potential subcontractors for review and approval by the District as part of the bid review process. The Bidder shall submit to the District a complete list of the actual subcontractors for review and approval not more than ten (10) business days after the District's acceptance of their Bid and execution of a signed Agreement.

ARTICLE 4 BIDDING PROCEDURES

4.2 BID SECURITY

4.2.4 Each Bid (i.e. each Bid Form) must be accompanied by a Bid Bond or Certified Check as surety in the amount of 10% of the bid and should be made payable to Cary Community Consolidated Unit School District 26. All Bid Bonds except that of the successful Bidder will be returned immediately after the award of contract.

ARTICLE 5 CONSIDERATION OF BIDS

5.3 ACCEPTANCE OF BID (AWARD)

5.4 The Owner is not obligated to accept the lowest or any other bid and reserves the right to reject any and all bids, to waive any informalities in bidding procedure and to award the Contract to the lowest responsible bidder, as determined by the District. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

5.3.3 In evaluating bids, the Owner shall consider the qualifications of the Bidders, conformity with the Bid Documents, terms of delivery, quality and serviceability, and all other factors the Owner will consider when

awarding the Bid.

5.3.4 The Contract will be awarded to the lowest qualified Bidder complying with the conditions of the Bidding Documents, provided that the lowest bid submitted is reasonable and that it is in interest of the Owner to accept it. The Bidder to whom the award is made will be notified at the earliest possible date. The Owner reserves the right to reject any and all bids, and to waive any irregularities in bids received whenever such rejection or waiver is in the interest of the Owner. The Owner also reserves the right to reject the bid of any Bidder who has previously failed to perform properly or complete on time construction Contracts of a similar nature; who is not in a position to perform the contract; or who has habitually and without just cause neglected the payment of bills or otherwise disregarded any obligation to subcontractors, material suppliers, or employees. In determining the lowest qualified Bidder, the following elements, in addition to those above mentioned, will be considered: Whether the Bidder involved (a) maintains a permanent place of business; (b) has adequate plant equipment to do the work properly and expeditiously; (c) has a suitable financial status to meet obligations incidental to the work; (d) has appropriate technical experience; (e) has failed to attend the mandatory pre-bid meeting; or (f) has submitted a properly completed Contractor's Qualification Statement.

5.3.5 The Owner may conduct such investigations as the Owner deems necessary to assist in the evaluation of any bid and to establish the responsibility, qualifications and financial ability of the bidders to furnish the goods and special services in accordance with the Contract Documents to the Owner's satisfaction within the prescribed time.

5.3.6 The Owner reserves the right to reject the bid of any bidder who does not pass any such evaluation to the Owner's satisfaction.

5.3.7 In determining whether a Bidder is a "Responsible Bidder," the Owner will take into consideration all information available relating to the Bidder's past history in completing work on time and reputation for proceeding with jobs in a prompt, efficient manner without conflict with the Owner and, in that regard, will consider all of the information provided by the Bidder and by others and will particularly consider whether the Bidder has engaged in any of the following activities and other activities that cause disruption to the smooth procedures of the working process:

5.3.8.1 Any activities which have led to disruption of the steady performance of the work.

5.3.8.2 Has taken advantage of a tight schedule to call for extras.

5.3.8.3 Has failed to meet time deadlines and has made requests for extension of time deadlines.

5.3.8.4 Has engaged in court or arbitration action against owners on questions arising during the project.

5.3.9 The Owner shall make such further investigations of Bidders as deemed necessary to determine the ability of the Bidder to perform the work and the Bidder shall furnish to the Owner all such data for this purpose as the Owner may request. The Owner reserves the right to reject any bid if the evidence submitted, or investigation of such Bidder, fails to satisfy the Owner that such Bidder is properly qualified to carry out the obligations of the contract and to complete the work contemplated.

5.3.10 The Cary Community Consolidated School District 26 Board of Education is not obligated to accept the lowest or any other bid and reserves the right to reject any and all bids, to waive any informalities and irregularities in bidding procedure and to award the contract to the lowest responsible bidder, as determined by the District. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

5.3.11 In evaluating bids, Owner shall consider the qualifications of the Bidders, conformity with the Bid Documents, terms of delivery, quality and serviceability, or any other factors when considering the award of the bid.

5.3.12 The District may conduct such investigations as deemed necessary to assist in the evaluation of any bid and to establish the responsibility, qualifications and financial ability of the bidders to furnish the goods and special services in accordance with the Contract Documents to the District's satisfaction within the prescribed time.

ARTICLE 6 POST-BID INFORMATION

6.1.1 Contractor is responsible for complying with all requirements of the Illinois Prevailing Wage Act ("Act"), 820 ILCS Section 130/0/01, et seq.

6.1.2 The Contractor must pay the general prevailing rate of wages in the locality for each craft or type of worker or mechanic needed to execute the contract or perform such work, also the general prevailing rate for legal holiday and overtime work, as ascertained by the public body or by the Department of Labor shall be paid for each craft or type of worker needed to execute the contract or to perform such work, and it shall be mandatory upon the bidder and upon any subcontractor under him, to pay not less than the specified rates to all laborers, workers and mechanics employed by them in the execution of the contract or such work. Refer to Section enclosed Prevailing Wage Rate Schedule for additional information and requirements.

6.1.3 The Contractor must insert a provision or stipulation regarding the payment of prevailing wage rate into the subcontract and Contractor's bond.

6.1.4 The Contractor must post the relevant prevailing wage rates at a location at the Project Site that is easily accessible by the workers.

6.1.5 The Contractor and all subcontractors must create, and keep for at least three (3) years, records of all laborers, mechanics, and other workers employed by them on the Project. Refer to 820 ILCS 130/5/(a)(1) and 820 ILCS 130/5/(1), (b).

6.1.6 The Contractor must comply with all District security screening and check-in requirements and must maintain daily worker sign-in lists documenting all employees and subcontractors that visit the job site.

6.1.7 The Contractor must submit electronically, in Adobe Acrobat PDF format, a Certified Payroll to the Illinois Department of Labor (or Owner) every month for the duration of the Project including the signed statement. Submit the Illinois Department of Labor confirmation or the Certified Payroll to the Architect with the Contractor's Applications for Payment. Refer to 820 ILCS 130/5(a)(2).

6.1.8 The Contractor must create and maintain a daily sign-in log and have all workers sign-in and sign-out each day they visit the project site. The daily sign-in log must be submitted in Adobe PDF format along with the monthly with the Contractor's Application for Payment.

6.1.9 The Applications for Payment will not be reviewed until the Architect receives confirmation of the Contractor's online Certified Payroll submission or receives Adobe Acrobat PDF format copies of the

Contractor's Certified Payroll and the Contractor's daily sign-in log.

6.1.10 Refer to the Illinois Department of Labor's website for additional information and requirements.

6.1.11 Prior to the execution of the Contract, the successful Bidder shall submit a certification of insurance which meets the requirements of the Contract Documents.

6.1.12 Prior to the execution of the Contract, the successful Bidder shall submit the financial documentation and the subcontractor names for District review and approval.

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

7.2 TIME OF DELIVERY AND FORM OF BONDS

7.2.5 The successful Bidder shall furnish a one hundred percent (100%) Performance Bond and Materials and Labor Payment Bond (AIA Document B112) at which time the Bid Bond will be returned. Bonds must guarantee the payment of prevailing wage rates as determined by the Illinois Department of Labor.

7.2.6 The successful Bidder shall furnish Performance Bond and Materials and Labor Payment Bonds from a surety company or companies having a policyholders' rating not lower than "A" and a financial rating not lower than "X" in Best's Insurance Guide (current edition). Company must be licensed in the State of Illinois and shall show evidence of same."

ARTICLE 8 PERSONNEL

8.1.1 If any person employed on the work site be, in the opinion of any Cary Community Consolidated School District 26 Representative, intemperate, disorderly, incompetent, willfully negligent or dishonest in the performance of his/her duties, he or she shall be directed to cease work and vacate the job site immediately.

8.1.2 In the event the Contractor comes on the premises, he/she shall be responsible for conducting all activities on said premises in accordance with the provisions of the Occupational Safety and Health Act of 1970 and the standards and regulations issued thereunder. The Contractor shall agree to indemnify and hold harmless the Cary Community Consolidated School District 26, the Architect and all the Architect's consulting engineers for all claims and damages resulting from Contractor's failure to conduct his/her activities on the Owner's premises in accordance with said Act and the related standards.

ARTICLE 9 WORK SCHEDULE AND COMPLETION

9.1.1 Unless otherwise stated, Work shall be commenced by the Contractor immediately upon receipt of a written Notice To Proceed. Before Work is started, however, the Contractor shall notify the Owner's Representative of Cary Community Consolidated School District 26 of the methods and procedures he/she intends to use and no Work shall be started until these methods are to the satisfaction of the District Representative. Work shall be completed within the time stipulated in the Contract Documents.

9.1.2 Union work stoppages, union strikes, or the failure of a contractor's workers or subcontractors to cross a union picket lines or informational picket lines will not relieve the Contractor of their contractual obligations to complete the Work in accordance with the Construction Schedule. Liquidated damages will be charged to the Contractor if they fail to complete their specified Work on or before milestone dates, substantial completion dates, and final completion dates indicated in the Contract Documents.

END OF SECTION 000200

SECTION 000200 – PROJECT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawing and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 GENERAL

A. The following Project Requirements are in addition to the "Instructions to Bidders," AIA Document A701, Fifth Edition, 2018 and the Specification Section 000120 “Supplementary Instructions To Bidders” which modifies AIA Document A701.

B. BID BOND

1. Bids must be accompanied by a Bid Bond or Certified Check as surety in the amount of 10% of the bid and should be made payable to Cary Community Consolidated School District 26. All Bid Bonds except that of the successful bidder will be returned immediately after award of contract. Company or personal checks are not permitted.

C. INSURANCE

1. The successful bidder shall expressly bind himself/herself to defend and save the Owner, Architect, and the Architect's Engineers harmless from all suits or actions of every name and description including Scaffolding Act Liability. The successful bidder shall carry insurance, in company or companies acceptable to the Owner, for Worker's Compensation and Comprehensive General Liability. Refer to Division 00 Section "Supplemental Conditions" for additional requirements. Refer to Section 000700 General Conditions for additional requirements.
2. Each bidder shall submit prior to award of a contract a certification of insurance which meets the above specifications.

D. CLEANING

1. The Contractor shall, daily, at the completion of the work, at each site and/or location, remove and dispose of all rubbish, surplus materials, equipment, etc., and shall leave the site and/or locations absolutely clean and in good order to the satisfaction of the Owner and Architect.

E. SAFETY

1. The Contractor is solely responsible for all construction safety and for the safe passage of all pedestrian traffic and building occupants for the duration of the job. Any precautionary measures, necessary warning signs, etc., required to assist the Contractor in the performance of the work shall be at the Contractor's expense and provided for his/her quoted price.
2. The Contractor must comply with all District security screening and check-in requirements and must maintain daily worker sign-in lists documenting all employees and subcontractors that visit the job site.

F. PROTECTION OF WORK

1. The Contractor shall adequately protect the Work, adjacent property, construction and finishes, and the public, and shall be responsible for any damage or injury due to his/her neglect.
2. The Contractor shall be entirely responsible for all apparatus, equipment and appurtenances furnished by him/her in connection with the work and special care shall be taken to protect all parts thereof in such a manner as may be necessary or as directed.

G. DEFAULT

1. In case of default by the Contractor, the Owner may procure the articles or services from other sources and hold the Contractor responsible for any cost occasioned thereby.

H. CANCELLATION OF CONTRACT

1. In case of bankruptcy of the Contractor or failure of the Contractor to pay suppliers or workers or a work stoppage or a failure by the Contractor to provide sufficient workers for the job or sufficient material for the job, the Owner may terminate, with seven days written notice, the Contract and take over the completion of the project, applying the unpaid balance of money for the Contract to the completion of the Work and any extra expenses incidental thereto.

I. PROGRESS PAYMENTS

1. Payments shall be made as specified in Section 012900 - Payment Procedures and on the following basis:

    a. First Payment - for cost of materials delivered to job site, less 10% retainage.
    b. Subsequent Payments - upon documentation of progress, less 10% retainage.
    c. Substantial Completion - Upon substantial completion of the work - the Contractor may apply for reduction to 5% retainage. Additional amounts may be withheld by the Architect for extensive punch list items or incomplete work. Refer to Division 01 for additional information and requirements.
    d. Final Completion - 5% retainage upon satisfactory completion of the punch list and all final completion requirements. Refer to Division 01 for additional information.

J. WAIVERS OF LIEN

1. Supporting partial Waivers of Lien for each subcontractor, supplier, and prime contractor must accompany each request for progress payment. Waivers must spell out the exact description of Work performed for which Waiver is issued.
2. For final payment it is necessary to submit final waivers in the full amount of the contracts for all subcontractors, suppliers and prime contractors.
3. Waivers must be accompanied by a sworn statement listing subcontractors and suppliers, the amounts of their contracts and the amounts requested.
4. No payment shall become due until after the Contractor, if required, delivers to the Owner a complete release of all liens arising out of this contract, or receipts in full in lieu thereof and, if required in either case, an affidavit that so far as he/she has knowledge or information the releases and receipts shall include all the labor and material for which a lien could be filed. If any lien remains unsatisfied after all payments are made, the Contractor shall refund the Owner all monies that the latter may be compelled to pay in discharging such a lien, including all costs, Architectural/Engineering fees, and attorneys' fees.

K. MANDATORY PRE-BID MEETING & FIELD VERIFICATION

1. All prospective contractors are required to attend a mandatory pre-bid meeting and conduct on-site field verification of all existing conditions. Prospective subcontractors and suppliers are urged to attend and verify existing conditions. Failure to attend the Mandatory Pre-Bid Meeting and perform site field verification may, at the Owner's option, be grounds for rejection a Bid Proposal.

L. REJECTION OF BIDS: AWARD OF CONTRACT

1. The Contract will be awarded to the lowest qualified bidder (in the Owner's sole opinion) complying with the conditions of the Bidding Documents, provided that the lowest bid submitted is reasonable and that it is in interest of the Owner to accept it. The bidder to whom the award is made will be notified at the earliest possible date. The Owner reserves the right to reject any and all bids, and to waive any irregularities in bids received whenever such rejection or waiver is in the interest of the Owner. The Owner also reserves the right to reject the bid of any bidder who has previously failed to perform properly or complete on time Contracts of similar nature; who is not in a position to perform the contract; or who has habitually and without just cause neglected the payment of bills or otherwise disregarded any obligation to subcontractors, material suppliers, or employees.

2. In determining the lowest qualified bidder, the following elements, in addition to those above mentioned, will be considered: Whether the bidder involved (a) maintains a permanent place of business; (b) has adequate plant equipment to do the Work properly and expeditiously; (c) has a suitable financial status to meet obligations incidental to the Work; (d) has appropriate technical experience; (e) has failed to attend the mandatory pre-bid meeting; and (f) has failed to submit a properly completed Contractor's Qualification Statement.

M. QUALIFICATIONS OF BIDDER

3. Each bidder shall submit with his bid a current AIA Document A305, Contractor's Qualification Statement. Failure of a bidder to submit a fully completed Contractor's Qualification Statement may, at the Owner's option, be considered grounds for rejecting a bid.
4. The Owner may make further investigations of bidders as he/she deems it necessary to determine the ability of the bidder to perform the work and the bidder shall furnish to the Owner all such data for this purpose as the Owner may request.
5. The Owner reserves the right to reject any bid if the evidence submitted, or investigation of such bidder, fails to satisfy the Owner that such bidder is properly qualified to carry out the obligations of the contract and to complete the work contemplated.
6. Bidder shall have the appropriate bonding capacity to bond 100 percent of its proposed contract amount, as required by these Contract Documents. The bonding company must be licensed in the State of Illinois.
7. The Bidder must have a minimum of five (5) years' experience in Illinois public school construction. The Bidder will provide a summary of all Illinois public school work completed in the last five (5) years. For each project, include the name and dollar value of the s completed in the school project and the names and telephone numbers of the Owner and Architect.
8. The Bidder shall have successfully completed at least five (5) comparable Illinois public school renovation projects of similar size and scope during the last five (5) years. The Bidder shall

submit a list of references and past projects, including Illinois public school roofing projects with their Qualifications.

9. The Bidder submitting the actual Bid shall have their own place of business, equipment, staff, manpower, etc., required for the type of work they are licensed to perform.
10. If requested, the Bidder shall provide the necessary financial information to the District, including, but not limited to, the financial statements for the three (3) previous years of the apparent successful Bidder. The financial statement shall have been prepared and certified by a C.P.A.
11. The Bidder shall submit a list all penalties or liquidated damages incurred by the Bidder's organization in the last five (5) years.
12. Resume of all key personnel (i.e., Principal, Project Manager, Superintendent(s)) to be assigned to the project.
13. In determining whether a Bidder is a "responsible Bidder," the Owner will take into consideration all information available relating to the Bidder's past history in completing work on time and reputation for proceeding with jobs in a prompt, efficient manner without conflict with the Owner and, in that regard, will consider all of the information provided by the Bidder and by others and will particularly consider whether the Bidder has engaged in any of the following activities and other activities that cause disruption to the smooth procedures of the working process:

    a. Any activities which have led to disruption of the steady performance of the work.
    b. Has taken advantage of a tight schedule to call for extras.
    c. Has failed to meet time deadlines and has made requests for extension of time deadlines.
    d. Has engaged in court or arbitration action against owners on questions arising during the project.

PART 2 - PRODUCTS

PART 3 - Not applicable.

PART 4 - EXECUTION

4.1 Not applicable.

END OF SECTION 000200

SECTION0 000300 - BID FORM

BID DUE DATE: _____

BID TO: **Cary Community Consolidated School District 26**
2115 Crystal Lake Road
Cary, Illinois 60013

BID FROM: _____

_____

_____

_____

BID FOR: **Renovations and Improvements**

Deer Path Elementary School
2211 Crystal Lake Road
Cary, Illinois 60013

Three Oaks School
1514 Three Oaks Road
Cary, Illinois 60013

ARCHITECT'S
PROJECT NO.: **CSG840**

The Undersigned Acknowledges Receipt of:

Bid Documents for the work indicated above, including the Project Manual and Drawings and all addenda listed below:

Addenda: No. _____, dated _____

No. _____, dated _____

No. _____, dated _____

No. _____, dated _____

No. _____, dated _____

No. _____, dated _____

(Failure to acknowledge all addendum on the Bid Form may subject the Bidder to disqualification.)

Having examined the site of the work, and having familiarized himself or herself with local conditions and existing site conditions affecting the cost of the work and with all requirements of the bidding documents including the Project Manual, Invitation to Bid, Instructions to Bidders, Supplementary

Instructions to Bidders, General Conditions, Supplementary Conditions, Specifications, Drawings, and duly issued Addenda, hereby agrees to perform all work and furnish all labor, material and equipment specifically required by the Bidding Documents, exclusive of alternate bids.

The Undersigned Agrees:

To furnish and/or install the described material and/or services for stated lump sum price and unit prices.

To hold this base bid and alternate bids open until sixty (60) calendar days after the bid opening date.

To accept the provisions of the Bid Form, Invitation to Bid, Bid Notice, Instructions to Bidders, Supplementary Instructions to Bidders, General Conditions, Supplementary Conditions, Specifications, Drawings, Addenda, and disposition of bid security.

To enter into and execute a contract with the Owner, if awarded on the basis of this bid, and in connection therewith to:

1. Furnish all bonds and insurance required by the Bidding Documents and as defined in the Supplementary Conditions.
2. Accomplish the work in accordance with the Contract.
3. Complete all required work by the completion date(s) and in accordance with the schedule specified in the Bidding Documents.
4. To pay liquidated damages (if specified) if the Bidder fails to complete all necessary work by the established completion date(s).

Bid Deposit:

The undersigned furnishes herewith, as required in the Instructions to Bidders, a **bid deposit in the amount of 10%** of the amount bid.

Bidder to check form of deposit furnished below:

_____ Cashier's Check

_____ Certified Check made payable to the Owner

_____ Bid Bond naming the Owner as obligee

It is understood and agreed that should the undersigned fail to enter into a contract with the Owner or furnish acceptable contract security within the time and in the manner specified, the bid deposit shall be retained by the Owner as liquidated damages and not as a forfeiture. As it is impossible to determine precisely an exact amount of damages the Owner will sustain, it is agreed that the bid deposit is a fair and equitable estimate of such damages.

Start Dates/Completion Dates:

The Owner will not be responsible for any additional costs due to the Contractor or Subcontractors for performing work on evenings, weekends, or holidays in order to complete the work of the Contract Documents on or before the required substantial completion date(s) or final completion date(s) specified in this Bid Form and agreed to by the Bidder.

Submittal Dates: The undersigned agrees to begin preparation of all submittals immediately upon receipt of a Notice to Proceed and to issue a submittal schedule and / or begin issuance of the submittals within fifteen (15) business days of receipt of a fully executed Contract.

Commencement Date: The undersigned agrees to begin work immediately upon receipt of the Owner's Notice To Proceed. It is the District's intention to issue a Notice to Proceed no later than **February 25, 2026.**

Substantial Completion Date: The Contractor agrees to have the work substantially complete for unobstructed Owner Occupancy of all project areas **on or before August 7, 2026.** (Liquidated Damages are associated with this Completion Date.)

Final Completion Date: The Contractor agrees to have the scope of work complete and all Punch List items completely within thrity (3) days of issuance of the final punch list. After the commencement of student attendance, all incomplete work will be performed during non-student attendance hours or non-school attendance days.

Completion Dates:

The undersigned agrees to provide the level of manpower required to complete all necessary work associated with the Substantial Completion of the Base Bid and all Alternate Bid Scope of Work for Owner occupancy for the above noted Base Bid Lump Sum amount on or before the Substantial Completion and Final Completion Date(s).

The undersigned agrees to the assessment of liquidated damages for each calendar day the work is not substantially complete after the substantial completion date.

Liquidated Damages:

For each and every calendar day the work or any portion or the work remains incomplete after the expiration of the time limits and/or completion dates set forth in the Contract documents, the Owner will access liquidated damages. The amount per calendar day indicated in the AIA A201 General Conditions will be deducted from the money due or to become due to the Contractor, not as a penalty, but as liquidated damages and added expense including administrative and inspection cost.

Liquidated Damages in the amount of **One Thousand Dollars ($1,000.00)** per day per project site will be assessed for every calendar day the work is not Substantially Complete on or before the **Substantial Completion Date of August 7, 2026**.

Base Bid :

For providing all work, including any respective allowances, as required for performing all the Base Bid Scope of Work as shown on the drawings and described in the specifications.

Base Bid Lump Sum of:

_____ Dollars ($_____).
(Include Owner's Contingency Allowances and value of each Product Allowance in the Base Bid Lump Sum.)

Base Bid Schedule of Values

Complete the following Schedule of Values totaling the amount of the base bid indicated above. Break costs down into line items following the format indicated. The base bid schedule of values will provide the Owner with documentation essential for the prompt comparison and evaluation of the bids. FAILURE TO COMPLETE THE SCHEDULE MAY BE GROUNDS FOR REJECTION OF THE BID PROPOSAL.

BASE BID SCHEDULE OF VALUES			
	Section	**Section Title / Description of Work**	**Cost**
Division 00	ALL	General Conditions / Overhead and Profit	
Division 01	ALL	General Requirements	
	012100	Allowance No. 1 - General Construction	$120,000
	012100	Allowance No. 2 - Roofing Contractor	$20,000
	012100	Allowance No. 3 - Door Hardware	$240,000
	012100	Allowance No. 4 - Wireless Door Hardware	$280,000
	012100	Allowance No. 5 - Wireless Integration	$170,000
	012100	Allowance No. 6 - Sound System	$50,000
	012100	Allowance No. 7 - New Flooring	$70,000
	012100	Product Allowance No, 8 - Sprinkler Heads	
	012100	Product Allowance No. 9 - Receptacle Plates	
	012100	Product Allowance No. 10 - Visual Display	
Division 02	ALL	Existing Conditions	
Division 03 - 07	ALL	All Sections	
Division 08		Openings	
Division 09 - 10	ALL	Finishes / Specialties	

BASE BID SCHEDULE OF VALUES			
	Section	**Section Title / Description of Work**	**Cost**
Division 12	ALL	Furnishing	
Division 22	ALL	Plumbing	
Division 23	ALL	Mechanical	
Division 26-28	ALL	Electrical	
		Base Bid Grand Total **(Must match Base Bid Lump Sum amount)**	

Alternate Bid Number One (1) - Courtyard Window Replacement (Three Oaks School)

ADD a lump sum of:

_____**Dollars ($_____).**
(This Alternate Bid is an ADD ALTERNATE and IS NOT INCLUDED in the Base Bid lump sum)

Contractor Proposed Alternates and Substitutes:

The following is a list of bidder or contractor proposed alternate and substitute products. The bidder understands that acceptance or rejection of any substitution listed below is the option of the Owner. Proposed alternates or substitutes will not be used by the Owner for determining the lowest responsible bid but may be used by the Owner as part of the overall Bid consideration process.

If additional space is required, attach a separate list and indicate such attachment by checking this space: _____.

Work Specified	**Contractor Proposed Alternate**	**Change in Base Bid**

Bid Acceptance:

If written notice of the acceptance of this bid is mailed, telegraphed, faxed or delivered to the undersigned within the time noted herein, after the date of opening of bids or at any time thereafter before this bid is withdrawn, the undersigned agrees that he or she will execute a construction contract (AIA Document A101, current edition) in accordance with the bids as accepted. He or she will obtain performance and payment bonds with such surety or sureties as the Owner may approve cost of which shall be included in the base bid.

The Owner reserves the right to award the contract to its best interests, to reject any or all bids, to waive any informalities in bidding and to hold all bids for the bid guarantee period. The Owner reserves the right to award separate contracts for any of the items of work bid herein.

Representations and Certifications:

The bidder makes the following representations and certifications as part of his bid on the project herein identified in the Bid Form. In the case of a joint venture bid, each party represents and certifies as to his own organization.

SURETY. I have notified a Surety Company that I am submitting a bid for work to be performed on the project. The Surety Company has agreed to issue a performance and labor and material payment bond for my work if my bid is accepted and the contract awarded to me.

AVAILABILITY. The number and amount of contracts and awards pending which I am and/or will be obligated to perform, now and during the course of the project, will not interfere with or hinder the timely prosecution of my work.

INDEPENDENT PRICE DETERMINATION. The contract sum in this bid has been arrived at independently, without consultation, communication or agreement for the purpose of restricting competition.

PREVAILING WAGE. The contractor and each subcontractor shall pay not less than the general prevailing rate of hourly wages for work of a similar character in the locality in which the work is performed and not less than general prevailing rate of hourly wages for legal holidays and overtime work in the performance of work under this contract, as established by the Illinois Department of Labor, pursuant to an act of the General Assembly of the State of Illinois approved June 26, 1941 as amended according to the Illinois Revised Statutes, Chapter 48, Section 39s-1, et seq.

Pursuant to Illinois Revised Statutes, Chapter 48, Section 39s-5, the contractor and each subcontractor shall keep an accurate record showing the names and occupation of all laborers, workers and mechanics employed by them, and also showing the actual hourly wages paid to each such individual, which record shall be open at all reasonable hours to inspection by the Owner, its officers and agents, and to agents of the Illinois Department of Labor.

The contractor and each subcontractor hereby agree, jointly and severally, to defend, indemnify and hold harmless the Owner and Architect from any and all claims, demands, liens or suits of any kind or nature whatsoever (including suits for injunctive relief) by the Illinois Department of Labor under the Illinois Prevailing Wage Act, Illinois Revised Statutes, Chapter 48, Section 39s-1, et seq., or by any laborer, worker or mechanic employed by the contractor or the subcontractor who alleges that he has been paid for his services in a sum less than prevailing wage rates required by Illinois law. The Owner agrees to notify the contractor or subcontractor of the pendency of any such claim, demand, lien or suit.

BID-RIGGING/BID ROTATING. The undersigned is not barred from bidding on this project as a result of a violation of either Section 33E-3 (Bid-rigging) or Section 38E-4 (Bid rotating) under Article 33E of Chapter 38 of the Illinois Revised Statutes.

Signature:

The undersigned respectfully submitted this _____ day,

in the month of _____, 20___.

Type of Firm (Bidder to indicate)

_____ Individual

_____ Partnership

_____ Corporation

_____ Joint Venture

_____
(Firm Name)

_____

_____
(Address)

(AFFIX CORPORATE SEAL)

_____
(Telephone Number)

_____
(Authorized Bidder's Name)

_____
(Authorized Bidder's Signature)

_____
(Title)

Subscribed and sworn to me this _____ day of _____, 20___.

Notary Signature: _____

_____
(Printed Name) (AFFIX NOTARY SEAL)

END OF SECTION 000300

CERTIFICATION OF NON-COLLUSION

I, _____ **(insert name and title]** of _____**(insert name of company)**, hereby state under oath that to the best of my knowledge and belief, neither I nor any employee, director, or officer of _____**(insert name of company)** have attempted to influence, in any manner whatsoever, any member of the Board of Education of Cary Community Consolidated School District No. 26 (the "Board"), or any employee thereof, either directly or indirectly, in the award of the attached contract or to collude or otherwise limit competition in the award of the attached contract. I further acknowledge that providing this certification is a material inducement of the Board to enter into the attached contract and that if this certification is false in any way, notwithstanding anything in the attached contract to the contrary, the contract attached hereto may be terminated by the Board without any cost or penalty.

By signing this certification, I acknowledge that I have read this document in full, understand its terms and have the proper authority to execute it on behalf of **[insert name of company]**.

[INSERT NAME OF COMPANY]

By: _____

Print Name: _____

Date: _____

ADOPTED: November 16, 2009

SECTION 000400 - PREVAILING WAGES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawing and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Illinois Department of Labor Prevailing Wages for McHenry County.

B. Related Sections include the following:

1. Division 00 Section "General Conditions" for additional prevailing wage rate requirements.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PREVAILING WAGES

A. The Contractor and all subcontractors shall not pay less than the prevailing rate of hourly wages for work indicated on the most current edition of the Illinois Department of Labor Prevailing Wages for McHenry County schedule.

1. Contractor is responsible for complying with all requirements of the Illinois Prevailing Wage Act ("Act"), 820 ILCS Section 130/0/01, et seq.
2. The Contractor must pay the general prevailing rate of wages in the locality for each craft or type of worker or mechanic needed to execute the contract or perform such work, also the general prevailing rate for legal holiday and overtime work, as ascertained by the public body or by the Department of Labor shall be paid for each craft or type of worker needed to execute the contract or to perform such work, and it shall be mandatory upon the bidder and upon any subcontractor under him, to pay not less than the specified rates to all laborers, workers and mechanics employed by them in the execution of the contract or such work.
3. The Contractor must insert a provision or stipulation regarding the payment of prevailing wage rate into the subcontract and Contractor's bond.
4. The Contractor must post the relevant prevailing wage rates at a location at the Project Site that is easily accessible by the workers.
5. The Contractor and all subcontractors must create, and keep for at least three (3) years, records of all laborers, mechanics, and other workers employed by them on the Project. Refer to 820 ILCS 130/5/(a)(1) and 820 ILCS 130/5/(1), (b).

6. The Contractor must comply with all District security screening and check-in requirements and must maintain daily worker sign-in lists documenting all employees and subcontractors that visit the job site.
7. The Contractor must submit Adobe Acrobat PDF electronic copies of their Daily Sign-In Lists and Certified Payroll to the Owner every month for the duration of the Project including the signed statement. Submit the Daily Sign-In Lists and Certified Payroll with the Contractor's Application for Payment. The Applications for Payment will not be reviewed until the Architect receives the Certified Payroll and the Daily Sign-In Sheets. Refer to 820 ILCS 130/5(a)(2).
8. Refer to the Illinois Department of Labor's website for additional information and requirements at www.state.il.us/agency/idol/laws/Law130.htm.

B. PREVAILING WAGE RATE SCHEDULE

1. The Contractor is required to obtain and post, at the project site, a current copy of the Illinois Department of Labor Prevailing Wages listing for McHenry County, effective at the start of on-site work.
2. The Contractor must contact the Illinois Department of Labor for current prevailing wages and must pay all workers prevailing wages.

END OF SECTION 000400

DRAFT

AIA® Document A201® – 2017

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)

«Renovations and Improvements 2026»
«Deer Path Elementary School
2211 Crystal Lake Road
Cary, Illinois 60013

Three Oaks Elementary School
1514 Three Oaks Road
Cary, Illinois 60013»

THE OWNER:
(Name, legal status and address)

«Cary Community Consolidated School District 26»
«2115 Crystal Lake Road»
«Cary, Illinois 60013 »

THE ARCHITECT:
(Name, legal status and address)

«Cashman Stahler Group, Inc.»
«1910 S. Highland Avenue, Suite 310»
«Lombard, Illinois 60148 »

TABLE OF ARTICLES

1 GENERAL PROVISIONS

2 OWNER

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, (4) an Architect's Supplemental Instruction, or (5) a written order for a minor change in the Work issued by the Architect.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams. Figured dimensions shall be followed in preference to measurements by scale. All shall be checked against field measurements of existing conditions to be taken by the Contractor.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section14.2.2.

§ 1.1.9 Product

The term "product" as used in the Contract Documents includes materials, systems, and equipment.

§ 1.1.10 Provide

Where the term "provide" appears, it shall be taken and interpreted to mean, "The Contractor shall furnish all labor, material, equipment, and necessary appurtenances or materials necessary to install and complete."

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§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.1.2 Where conflicts exist within or between parts of the Contract Documents, or between the Contract Documents and applicable standards, codes and ordinances, the more stringent, or higher quality or greater quantity requirements shall apply. Large-scale drawings tale precedence over small-scale drawings, figured dimensions over scaled dimensions and noted materials over graphic representations.

§ 1.2.1.3 The specifications are of the abbreviated type and may include incomplete sentences. Omissions of phrases such as "The Contractor shall" or "conforming to the requirements of" is intentional; omitted words or phrases shall be supplied by inference in the same manner as they are when a "note" occurs on the drawings. Words in singular shall include a plural whenever applicable, or the context so indicates.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.2.3.1 In the event of conflicts or discrepancies among the Contract Documents, interpretations will be based on the following priorities: 1) The Agreement, 2) Addenda, with those of later having precedence over those of earlier date, 3) The Supplementary Conditions, 4) The General Conditions of the Contract for Construction, 5) Drawings and Specifications.

§ 1.2.3.2 In the case of inconsistency between Drawings and Specifications or within either Document not clarified by addendum, the better quality or greater quantity of work shall be provided in accordance with the Architect's interpretation. Large scale drawings shall take precedence over small scale drawings; figured dimensions on the drawings over scaled dimensions and noted material over graphic representations.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement. The descriptive headings of this Agreement are inserted for convenience only and shall not control or effect the meaning or construction of any provisions following them.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

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§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.7 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.2 Information and Services Required of the Owner

§ 2.2.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.2.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.2.3 If the employment of the Architect terminates, the Owner shall employ a successor whose status under the Contract Documents shall be that of the Architect.

§ 2.2.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.2.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.2.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

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§ 2.3 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3. This right shall be in addition to and not in restriction or derogation of the owner's right under Article 14 hereof.

§ 2.4 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a seven-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may immediately, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the cost of correcting such deficiencies, including, but not limited to, attorney's fees, compensation for the Architect's additional services and expenses made necessary by such default, neglect or failure. Such Change Order shall be deemed signed by the Contractor for the purposes stated in Section 7.2.1 even if the Contractor fails to physically sign such Change Order. If the payments then or thereafter due the Contractor are not sufficient to cover such amount, at the Owner's option, the excess shall be deducted from any payment thereafter due or shall be paid by the Contractor immediately upon demand of the Owner.

§ 2.5 Additional Rights

The rights stated in Article 2 shall be in addition and not in limitation of any other rights of the Owner granted in the Contract Documents or at law or in equity.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site and inspected local conditions under which the Work is to be performed, has reviewed the Contract Documents, and correlated personal observations and inspections, and the bid, with all of the requirements of the Contract Documents.

§ 3.2.1.1 It shall be the duty of the Contractor to verify all dimensions given on the Drawings, and to report any error or inconsistency to the Architect before commencing work.

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§ 3.2.1.2 If the Contractor finds any details, construction procedures or materials shown on the Drawings or called for in the Specifications which he believes are not satisfactory for the use shown, he shall so notify the Architect at least five days before bids are due. Signing of the contract and starting work by the Contractor shall indicate his agreement with all details, construction procedures, and materials so shown and/or specified and shall indicate his willingness to construct the project in strict accordance with these Documents and to guarantee the complete project in full compliance with the warranty provisions of the Contract Documents. By executing this contract, the Contractor further acknowledges that he has satisfied as to the nature and location of the Work, the general and local conditions, including those bearing upon transportation, disposal, handling and storage of materials availability of labor, water, electric power, roads and uncertainties of weather, ground water table or similar physical conditions of the ground, the character, quality and quantity of surface and subsurface materials to be encountered, the character of equipment and facilities needed prior to and during the prosecution of the Work, and all other matters which can in any way affect the Work or the cost thereof under the Contract. Any failure by the Contractor to acquaint himself with all the available information concerning these conditions will not relieve him from any obligations with respect to the Contract.

§ 3.2.1.3 If work is required in a manner to make it impossible to produce work of the quality required by the Contract, or should discrepancies appear among the Contract Documents, the Contractor shall request in writing an interpretation from the Architect before proceeding with the Work. If the Contractor fails to make such a request, the Architect shall determine the quality of the work required, consistent with the Contract Documents, or which of the conflicting requirements shall govern. The Contractor shall perform the work at no additional cost to the Owner in accordance with the Architect's determination.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. The Contractor shall promptly report to the Owner and the Architect any errors, omissions, or inconsistencies in the Contract Documents. The Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies, or omissions in the Contract Documents unless the Contractor recognized or should have recognized such error, inconsistency, or omission, and failed to report it to the Architect, in which case the Contractor shall not be entitled to an increase in the Contract Sum or Contract Time and the Contractor shall bear all attributable costs for correction. The Contractor agrees to release and hold harmless the Owner for errors, inconsistencies or omissions in the Contract Documents.

§ 3.2.2.1 The exactness of grades, elevations, dimensions, existing conditions, or locations given on any drawings issued by the Architect or the work installed by other contractors, is not guaranteed by the Architect or Owner.

§ 3.2.2.2 The Contractor shall, therefore, satisfy himself as to the accuracy of all grades, elevations, existing conditions, dimensions and locations. In all cases of interconnection of the Contractor's work with existing or other work, the Contractor shall verify at the site all dimensions relating to such existing or other work. Any errors due to the Contractor's failure to so verify all such grades, elevations, existing conditions, locations or dimensions shall be promptly rectified by him without extra cost to the Owner.

§ 3.2.3 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, unless the Contractor recognized or should have recognized the error, inconsistency, omission, or difference and failed to report it.

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§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall review any construction or installation procedure (including those recommended by any product manufacturer.) The Contractor shall provide written notice to the Architect:

.1 If a specified product deviates from good construction practice.

.2 If following the Contract Documents will affect any warrantees.

.3 Any objections which the Contractor may have to the Contract Documents. The responsibility imposed on the Contractor by this Section shall be in addition to, and not be limited by, any and all other provisions of these Contract Documents.

§ 3.3.3 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.4 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.3.5 The Contractor shall engage workmen who are skilled in performing the Work and all Work shall be performed with care and skill and in a good workmanship manner under the full-time supervision of the approved superintendent described in Section 3.9.3. The Contractor shall be liable or all property damage including repairs or replacement of the Work and economic losses which proximately result from the breach of this duty. The Contractor shall be responsible to the owner for acts and omissions of the Contractor's employees, Subcontractors, and their agents and employees, and any other persons or entities performing portions of the Work for or on behalf of, the Contractor, any of its Subcontractors, or claiming by, through or under the Contractor, and for any damages, losses, costs, and expenses resulting from such acts or omissions.

§ 3.3.6 The Contractor shall not be relieved of obligations to perform the work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required of or performed by persons other than the Contractor.

§ 3.3.7 The Contractor shall assign a competent, technically-trained office project manager to this project who shall perform all office functions including checking, approving, and coordinating shop drawings and approving purchasing and disbursement payout requests and correspondence, and responding to Owner and Architect inquiries.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for any and all labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the written consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive. The Owner is under no obligation to consent to any substitutions. The Contractor is responsible for providing detailed cost, fabrication and/or delivery timeline documentation from the

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manufactures/suppliers of both the specified and substitute products in order to substantiate the necessity for the substitution. By making requests for substitutions hereunder, the Contractor:

.1 represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;

.2 represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified product;

.3 certifies that the cost data presented is complete and includes all related costs under this Contract except the Architect's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and

.4 will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them. The Contractor shall be responsible for any damages to property or injuries to persons, or to any other harm, caused by the Contractor's employees.

§ 3.4.4 After the Contract has been executed, the owner and the Architect will consider a formal request for the substitution of products in place of those specified only under the conditions set forth in Section 7.5.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects and in conformance with the Contract Documents. The warranty will not be affected by the specifications of any product or procedure, unless the Contractor objects promptly to such product or procedure and advised the Architect of possible substitute products or procedures which will not affect the warranty. This warranty shall not be restricted by the limitations of any manufacturer's warranty. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective in the Owner's sole discretion. Inability or refusal of the Subcontractor or supplier responsible for the defective work to correct such work shall not be excuse the Contractor from performing under the warranty. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage.

§ 3.5.3 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.5.4 Unless a warrantee is specified in a particular division of the Specifications that is longer in duration than two (2) years, the Work shall be guaranteed by the Contractor against defect in material and workmanship for a period of two (2) years from the date of Substantial Completion.

§ 3.5.5 The Contractor shall furnish maintenance and 24-hour call back service for the equipment provided for a period of three (3) months after the date of Final Completion. This service shall include regular examinations of the installations by competent and trained employees of the Contractor, and shall include all necessary adjustments, greasing, oiling, cleaning, supplies, and parts to keep the equipment in proper operations except such parts made necessary by misuse, accidents or negligence not caused by the Contractor or any of its subcontractors.

§ 3.6 Taxes

Retail sales tax will not be included in the bid amount. The owner is exempted by Section 3 of the Illinois Use Tax Act (Section 3, House Bill 1610, approved July 31, 1961, Illinois Revised Statutes 1967, Chapter 120, Section 439.3) from paying any of the taxes imposed by the Act and sales to owner are exempt by Section 2, House Bill 1609, approved July 31, 1961, Illinois Revised Statutes 1967, Chapter 120, Section 441) from any of the taxes imposed by the Act. The Department of Revenue of the State of Illinois under Rule No. 15, issued August 9, 1961,

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has declared that sales of materials to construction contractors for conversion into real estate for schools, governmental bodies, agencies and instrumentalities are not taxable retail sales. The Contractor shall be responsible for any sales, consumer, use and similar taxes for the Work.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for all permits, fees, licenses, and inspections by government agencies necessary or customary for proper execution and completion of the Work which are customarily secured after execution of the Contract and which are legally required at the time bids are received, except the Owner will obtain approvals from the Illinois State Board of Education. A local building permit is not required; however, licenses, bonds and utility or engineering permits may be required.

§ 3.7.1.1 All cash deposits, bonds, fees, inspections, licenses, or permit fees shall be paid for by the Contractor.

§ 3.7.1.2 Prior to submission of all applications for permits, licenses, or inspections the Contractor shall submit a copy of the application or written notice to the Owner for approval.

§ 3.7.3 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor observes that portions of the Contract Documents are at variance with applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work, the Contractor shall promptly notify the Architect and Owner in writing to be addressed by the Architect and owner. If the Contractor performs Work knowing it to be contrary to any applicable laws, statues, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriately responsibility for such Work and shall bear the damages, losses, costs, and expenses attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15. The site conditions contemplated by this Section include, but are not limited to, materials containing asbestos, polychlorinated biphenyl (PBC), or hazardous materials as defined in these General Conditions.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

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§ 3.8.2 Unless otherwise provided in the Contract Documents,

.1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

.2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and

.3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor. Important communications by the superintendent shall be confirmed in writing. Other communications by the superintendent shall be similarly confirmed on written request in each case. Failure of the superintendent shall be similarly confirmed on written request in each case. Failure of the superintendent to supervise the job properly shall be deemed as a default under the Contract Documents as determined by the owner with the advice of the Architect.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's written consent.

§ 3.9.4 The Contractor's superintendent must be dedicated solely to this project and must be at the project site each day and all times that work is being performed at the site, whether the work is performed by the Contractor's own forces or by any subcontractors. The superintendent must be at the project site from the first day of on-site activities until a minimum of fourteen (14) days after the date of Substantial Completion. Failure by the Contractor to provide full-time on-site supervision shall constitute grounds for termination of the Contract by the Owner with seven days written notice.

§ 3.9.5 The superintendent shall provide an on-site construction office, wither in a construction trailer provided by the Contractor or in a room in the building set aside by the Owner.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's approval the Contractor's construction schedule for the Work. Such construction schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work.

§ 3.10.2 The Contractor shall prepare and keep current, for the Architect's record only, a schedule of submittals (the "Submittal Schedule") which is coordinated with the Contractor's Construction Schedule and allows the Architect reasonable time, as indicated in the Contract Documents, to review submittals. Neither the Contractor's preparation of the Submittal Schedule nor the Architect's receipt or review shall modify the Contractor's responsibility to make required submittals or do so in a timely manner to provide for review in accordance with Section 4.2.7 as modified herein.

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§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect. The Owner's or Architect's silence to a submitted schedule that exceeds time limits current under the Contract Documents shall not relieve the Contractor of tis obligations to meet those limits, nor shall it make the Owner or Architect liable for any of the Contractor's damages incurred as a result of increased construction time or not meeting those time limits. Similarly. The Architect's or Owner's silence to a Contractor's schedule showing performance in advance of such time limits shall not create or infer any rights in favor of the contractor for performance in advance of such time limits.

§ 3.10.4 At the time of each Application for Payment, the Contractor shall provide to the owner and the Architect an update on the project schedule and a written status report, which includes a description of the progress of the Work and, of progress is behind schedule, the Contractors' plan to recover the original schedule. The report shall also include a summary of the Contractor's meetings with subcontractors.

§ 3.10.5 The Contractor shall hold meetings at least weekly (or at such intervals as are otherwise acceptable to the Owner) at the site. The Contractor shall provide the subcontractors, Architect, and the Owner with a schedule. The Contractor shall require subcontractors currently working at the site9s) to have a representative present for such meetings.

§ 3.10.6 Within thirty (30) days of the award of the Contract, the Contractor shall provide a written report to the Architect and the owner that includes a list of the Contractor's suppliers, a list of material and equipment to be purchased from suppliers and fabricators, the time required for fabrication, and the scheduled delivery dates for materials and equipment. Copies of the Contractor's purchase orders shall be delivered to the Architect and the Owner as soon as possible after receipt by the Contractor.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These, along with all Operating Manuals for all equipment, shall be available to the Architect and Owner at all times and delivered to the Architect for submittal to the Owner upon completion of the Work and before the final Application for Payment, as a record of the Work as constructed.

§ 3.11.1 The Contractor shall maintain at the site one (1) set of the plans and specifications as Field Record Documents for the Owner and Architect the plans and specification. Any deviations from conditions shown on the Contract Documents and concealed work shall be shown and dimensioned on the on these Field Record Documents. This requirement does not authorize any deviations without approval of the Architect.

§ 3.11.1.1 The field information to be so marked on these Field Record Documents shall include at a minimum:

(1) Significant deviations of any nature made during construction;
(2) Location of underground mechanical and electrical services, utilities, and appurtenances, referenced to permanent surface improvements;
(3) Location of mechanical and electrical services, utilities, and appurtenances that are concealed in the building, referenced to accessible feature of the building.

§ 3.11.2 The Contractor and their Subcontractors shall maintain at the site(s) an accurate record of deviations and changes from the Contract Documents which occur in the work; shall indicate all such deviations and changes on reproducible transparencies of the Contract Documents; and shall turn over to the Architect upon completion of the work all such documents and information, such as final shop drawings and sketches, marked prints and similar data indicating the as-built conditions. Plumbing, HVAC and Electrical Contractors shall record all changes of deviations in their work from what appears on the Contract Documents. The reproducible transparencies of the Contract Documents shall be furnished by the Architect. The cost of recording and transferring the changes or deviations to the transparencies shall be included in the contract price for the respective work. The as-built transparencies shall be delivered by the Contractor to the Architect prior to the final acceptance of the Project and issuance of final payments.

§ 3.11.2.1 From the field record prints of the Contract Drawings, the Contractor shall furnish and prepare on Mylar transparencies or on compact disk in CAD format, a complete set of field record drawings, completely dimensioned

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show all changes made during the course of the Work. Mechanical, plumbing and electrical field record drawings, shall locate by dimension each run of concealed pipe and conduit. Upon completion of the Work, the Contractor and each Subcontractor shall deliver and submit to the Architect a full set of all field record drawings, relating to the Work, on Mylar or on compact disk in CAD format and two sets of blueline prints.

§ 3.11.3 The Contractor shall cause each Mechanical and Electrical Contractor to provide the owner with the three 93) copies of all operating manuals at the time of delivery of each major piece of equipment.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 When professional certification or performance criteria of materials, systems or equipment is required by the Contract Documents, the Contractor shall provide the person or party providing the certification with full information on the relevant performance requirements and on the conditions under which the materials, systems, or

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equipment will be expected to operate at the project site. The certification shall be based on performance under the operating conditions at the project site. The Architect shall be entitled to rely on the accuracy and completeness of such certifications.

§ 3.13 Use of Site

§ 3.13.1 The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.13.2 Only material and equipment which is to be used directly in the construction of this Project shall be brought to and stored on the job site by the Contractor. After equipment is no longer needed on this Project, it shall be promptly removed from the job site. Protection of all construction materials and equipment stored at the Job Site is the sole responsibility of the Contractor.

§ 3.13.3 The Contractor and its subcontractors, and their respective employees, agents, and consultants, shall not enter any part or portion of the building work site when students are present without Owner's written authorization.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with prior written consent of the Owner and of the Separate Contractor. The Contractor's consent shall not be required.

§ 3.14.3 Only tradespersons skilled and experienced in cutting and patching shall perform such work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project. The Contractor shall remove and clean up hazardous materials in accordance with these General Conditions.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.15.3 All exterior and interior work shall be cleaned using specific materials as recommended for surfaces to be cleaned. Damage to any surfaces due to improper cleaning methods of materials shall be made good by Contractor, at no cost to the Owner.

§ 3.15.4 Building(s) shall be left broom clean and all existing and new material surfaces free of debris and construction duct.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, including, but not limited to, attorney's fees, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, except to the extent of Contractor's fault, or where the copyright violations are contained in Drawings,

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Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor waives any right of contribution against and shall defend, indemnify and hold harmless the Owner, any owner's Representatives, the Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense (these are collectively referred to as "claims") is caused in whole or in part by any negligent act or omission of Contractor, and Subcontractor, anyone directly or indirectly by any of them or anyone for whose acts any of them may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or otherwise reduce any other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Contract. The Contractor shall have exclusive responsibility to comply with the requirements of the Structural Work Act. The obligations of the Contractor under this Section 13.18.1 shall be constructed to include, but not be limited to injury, damage consequent upon failure to use or misuse by the Contractor, his agents, Subcontractors, and employees of any scaffold, hoist, crane, stay, ladder, support, or other mechanical contrivance erected or constructed by any person, or any or all other kinds of equipment, whether or not owned or furnished by the owner under the requirements of the Illinois Structural Work Act. It is understood that this excludes use by Owner, Architect or his Agents or Employees."

§ 3.18.2 The Contractor shall, and hereby covenants and agrees to indemnify, defend, save and hold harmless the following indemnities: The District, its Architects, Board Members, Officers, Agents, and Employees, individually and collectively, from all claims, demands, actions and the like, of every nature and description, made or instituted, by Third Parties, arising or alleged to arise out of the work under this contract, as a result of any act or omission of either the Contractor or any Subcontractor, or any of their employees or agents. Contractor and Subcontractor shall name the District, its Architects, Board Members, Officers, Agents and Employees, individually and collectively, as additional insured as primary coverage without limitation on their general liability policies. Contractor and Subcontractor/s shall furnish Owner with copies of such policies prior to beginning any work.

§ 3.18.3 "Claims, damages, loses and expenses" as these words are used in this Contract shall be construed to include, but not be limited to (1) injury or damage consequent upon the failure of or use or misuse by Contractor, its Subcontractors, agents, servants or employees, of any hoist, rigging, blocking, scaffolding, or any and all other kinds of items of equipment, whether or not the same be owned, furnished or loaned by Owner; (2) all attorneys' fees and costs incurred in defense of the claim or in bringing an action to enforce the provision of this Indemnity or any other indemnity contained in the Contract Documents; and (3) all costs, expenses, lost time, opportunity costs, etc. incurred by the party being indemnified or its employees, agents or consultants.

§ 3.18.4 In the event that any party is requested but refuses to honor the indemnity obligations hereunder, then the party indemnifying shall, in addition to all other obligations, pay the cost of bringing any such action, including attorneys' fees, time expended by the party being indemnified and their employees in the defense of any litigation covered by this indemnity provision at their usual rates plus cost of travel, long distance telephone calls and reproduction of documents to the party requesting indemnity.

§ 3.18.5 Contractor hereby knowingly and intentionally waives the right to assert, under the case of Kotecki v. Cyclops Welding Corp., 146 Ill.2nd 155 (1991) that Contractor's liability may be limited to the amount of its statutory liability under the Workers' Compensation Act, and agrees that Contractor's liability to indemnify and defend the Owner and Architect is not limited by the so called "Kotecki Cap".

§ 3.18.6 Contractor shall include in each and every contract with any and all subcontractors and/or material suppliers performing Work and require each and every subcontractor and/or material supplier performing Work to agree to be bound by all of the provisions 3.18.1 through 3.18.9 under the Contract Documents.

§ 3.18.7 Contractor's indemnity obligations hereunder shall, but not by way of limitation, specifically include all claims and judgments which may be made against the indemnitees under federal or state law or the law of the other governmental bodies having jurisdiction, and further, against claims and judgments arising from violation of public

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ordinances and requirements of governing authorities due to Contractor's or Contractor's employees method of execution of the Work.

§ 3.18.8 The indemnification provisions of this Section 3.18 are not intended to circumvent the Construction Contract Indemnification for Negligence Act, 740 ILCS 35/0.01 et seq.

§ 3.18.9 The Contractor shall indemnify and hold harmless the Owner in the event of labor or trade union conflicts or disputes between the Contractor and subcontractors and their respective employees. The Contractor shall endeavor to adjust and resolve such conflicts and disputes which affect the timely completion of the Work. Such conflicts or disputes shall not be a basis or excuse for the violation of the Contract Documents by the Contractor or its subcontractors, and shall not provide the Contractor with relief from meeting all time limits for Substantial Completion or Final Completion. Labor or trade union disputes that effect production or delivery of materials or equipment, or their installation, shall be at no cost to the Owner. The Contractor shall notify the Architect and the Owner in writing as soon as possible as to any labor or trade disputes which may affect the Work and its timely completion. In such event, the Contractor shall provide a written proposal to the Architect and the Owner which includes any comparable substitution(s) necessary to complete the Work.

§ 3.18.10 None of the foregoing provisions shall deprive the Owner or the Architect of any action, right or remedy otherwise available to them or either of them at law.

§ 3.18.11 If the work is to be performed by trade unions, the Contractor shall make all necessary arrangements to reconcile, without delay, damage, or cost to the Owner, the Architect or the Owner, any conflict between the Contract Documents and any agreements or regulations of any kind at any time in force among members or councils which regulate or distinguish what activities shall not be included in the work of any particular trade. In case the progress of the work is affected by any undue delay in furnishing or installing any items or materials or equipment required under the Contract Documents because of the conflict involving any such agreement or regulation, the Architect may require that other material or equipment of equal kind and quality be provided at no additional cost to the Owner.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's

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failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols. However, this Section shall not be deemed to prohibit direct communication between the Owner and the Architect.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component. The Contractor will give submittals to the Architect in a manner to allow for the Architect's reasonable prompt review and to allow for timely ordering of components of the Work to affect no delay in the Work.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will initially interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If the Contractor submits such written request by the Architect, the Contractor will simultaneously provide a copy of such

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request to the owner. The Architect will consult with the owner regarding any request by the Contractor before responding to the Contractor.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith and in the absence of negligence.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information. The Architect will provide the owner with a copy of any response provided pursuant to the Section.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Prior to executing the Contract, the Contractor shall furnish in writing to the Owner, through the Architect, the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within fourteen (14) days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity, or (2) that the Architect requires additional time for review.

§ 5.2.2 In addition to the information which may be required prior to the execution of the Contract, not later then thirty (30) days after Notice of Award of the Contract, the Contractor shall furnish to the Owner through the Architect the names of persons or entities proposed as manufacturers for each of the products identified in the General Requirements and, where applicable, the name of the installing Subcontractor.

§ 5.2.3 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection. All contracts between the Contractor and subcontractors shall be made in writing, shall be assignable to the Owner, and shall contain the following sentence, "The Owner is an intended third-party beneficiary of this subcontract."

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected without written approval of the Owner. The Contractor further acknowledges and agrees that after award of the Contract to the Contractor, any savings on changes to contracts with subcontractors or substitute subcontractors will be for the benefit of the Owner and will not be used for the benefit of the Contractor or to increase the Contractor's profit on the Project. The foregoing benefit to the Owner shall include any adjustment in the amount of the price of a contract to less than the quoted price of the subcontractor upon which the Contractor's fixed bid price or Contract Sum was based. Further, if a manufacturer or supplier of any machinery or equipment, including but not limited to heating and air conditioning units or systems, changes specifications or offers incentives, discounts or lower prices after

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award of the Contract to the Contractor, those savings will inure to the benefit of the Owner and not the Contractor, subcontractor, manufacturer or supplier.

§ 5.3 Subcontractual Relations

§ 5.3.1 By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.3.2 The Contractor shall be responsible for any and all Subcontractors working under him and shall carry insurance for all Subcontractors or ensure they are carrying it for themselves so as to relieve the owner, Architect and Architect's Consultants of any and all liability.

§ 5.3.3 The Owner and Architect assume no responsibility for overlapping or omission of parts of the Work by various Subcontractors in their Contracts with the Contractor.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- **.1** assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
- **.2** assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation without altering the Owner's agreement with the Contractor.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

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§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.1.4 For any changes in the Work requested by the Contractor involving more than a three (3) calendar day extension of time, the Contractor shall submit critical path schedules showing the original schedule and impact of the proposed change justifying the requested extension of time. The Owner may at its option refuse the extension of time and have the Contractor perform the work within the original schedule provided all reasonable costs for completing the work including overtime and acceleration costs are included in the Change Order.

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§ 7.1.5 If a proposal for additional work is requested by the Owner from the Contractor which involves additional time, at the Owner's option, the Owner may extend the completion date for that portion of the work included in the change, without extending the Contract Time for the remainder of the work.

§ 7.1.6 Changes which involve credits to the Contract Sum shall include overhead, profit, general conditions, and bond and insurance costs.

§ 7.1.7 For any adjustments to the Contract Sum based on other than the unit price method, overhead, profit, and general conditions combined shall be calculated at the following percentages of the cost attributable to the change in the work:

.1 For the Contractor for Work performed by the Contractor's own forces, ten percent of the cost.
.2 For the Contractor, for Work performed by the Contractor's Subcontractors five percent of the amount due the Subcontractor.
.3 For each Subcontractor or Sub-subcontractor involved, for Work performed by that Subcontractor's or Sub-subcontractor's own forces, ten percent of the cost.
.4 For each Subcontractor, for Work performed by the Subcontractor's Sub-subcontractors, five percent of the amount due the Sub-subcontractor.
.5 Costs to which overhead, profit, and general conditions is to be applied shall be determined in accordance with Sub-Sections 7.3.6.1 through 7.3.6.5.
.6 When both additions and credits are involved in any one change, the allowance for overhead and profit shall be figured on the basis of the net increase, if any;

§ 7.1.8 In order to facilitate checking of quotations for extras or credits, all proposals shall be accompanied by:

.1 A complete itemization of costs including labor, material.
.2 Subcontractor's, Sub-subcontractor's and material suppliers for their portions of the work itemized to include labor, material.
.3 Labor costs shall be indicated hourly wage and fringe benefits. Labor hours shall be provided for each phase of the work.
.4 Material costs shall include unit costs and units required where applicable.

§ 7.1.9 The Contractor understands that change orders to the contract which increase or decrease the cost by $10,000 or more, or the time of completion by 30 days or more, will require written documentation by the Owner that the changes:

.1 were not reasonably foreseeable at the time the contract was signed;
.2 were not within the contemplation of the contract as signed; and
.3 are in the best interest of the district or region and authorized by law.

§ 7.1.10 The Contractor shall provide written notice to the Architect and the Owner if overtime labor rates are included in the computation of the cost of a proposed Change Order or Construction Change Directive.

§ 7.1.11 In the event that the Contractor and the Owner do not reach agreement on a Change Order or a Construction Change Directive, the Owner may, in its discretion, delete the labor, materials and equipment that are the subject of the Change Order or the Construction Change Directive from the Work to be performed under the Contract Documents. The Owner shall receive credit from the Contractor for the labor, materials, and equipment, including Contractor overhead and profit attributable to the deleted work. The Owner may complete the deleted work through another contractor or subcontractor.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

.1 The change in the Work;
.2 The amount of the adjustment, if any, in the Contract Sum; and
.3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract

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Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- **.1** Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- **.2** Unit prices stated in the Contract Documents or subsequently agreed upon;
- **.3** Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- **.4** As provided in Section 7.3.4.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the owner of Contractor, the applicable unit prices shall be equitably adjusted.

§ 7.3.5 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

- **.1** Actual costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- **.2** Actual costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
- **.3** Actual rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- **.4** Actual costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
- **.5** Actual additional costs of supervision and field office personnel directly attributable to the change. Cost of supervision, unless directly attributable to change, will not be allowable as an itemized cost for any additions (or credited for deletions) unless a change in the Contract Time is made. Overtime when specifically authorized by the Owner shall be paid for by the Owner on the basis of a premium payment only, plus the cost of insurance and taxes based on the premium payment. Overhead and profit will not be paid by the Owner for overtime. Field tickets must be signed by the Architect for verification of overtime hours.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Upon resolution of exact scope, Contract Sum change, and Contract Time change, a Change Order shall be prepared incorporating the Construction Change Directive.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be computed in accordance with Section 7.3.7 actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the

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allowance for overhead and profit shall be figured on the basis of net increase or decrease, if any, with respect to that change. Also, if the amount of either the credit or the addition is in dispute, the amount of the other, non-disputed item may not be included in Application for Payment. Overhead and profit will be included in credits to the same extent they are included in addition.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.3.11 Change orders that result in a net decrease in or credit to the Contract Sum must include a credit to the Owner for the Contractor's overhead and profit as described in Section 7.1.7.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

§ 7.5 Substitutions

§ 7.5.1 After the award of the Contract, a request by the Contractor for a substitution of materials or equipment in place of those specified in the Contract Documents will be considered only under one or more of the following conditions:

- **.1** Required for compliance with interpretation of code requirements or insurance regulations then existing.
- **.2** Unavailability of specified products, through no fault of the Contractor.
- **.3** Subsequent information discloses inability of specified products to perform properly or to fit in designated space.
- **.4** Manufacturer/fabricator refuses to certify or guarantee performance of specified product as required.
- **.5** When it is clearly seen, in the judgment of the Architect and with the Owner's approval, that a substitution would be substantially to the Owner's best interests, in terms of cost, time, or other considerations.

§ 7.5.2 Substitution requests shall be written, timely, and accompanied by adequate technical and cost data. Requests shall include a complete description of the proposed substitution, name of the material or equipment for which it is to be substituted, drawings, cuts, performance and test data, and any other data or information necessary for a complete evaluation by the Architect.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

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§ 8.1.4 The term "day" as used in the Contract Documents shall mean working day, excluding weekends and legal holidays, unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time. The Contractor shall bear all additional costs incurred to meet the Contract Time, which may require working overtime without additional compensation.

§ 8.2.4 The Contractor shall reimburse the owner for all fees or expenses, including without limitations, the Architect, Engineers, and legal expenses, for additional services necessitated by Contractor's failure to obtain Substantial Completion within the time established in the agreement and for more than one inspection for Substantial Completion or final inspection.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, or by other causes which the Architect and Owner determines, in their sole discretion, may justify delay, then the Contract Time shall be extended for such reasonable time as the Architect and Owner may determine.

§ 8.3.2 The Contractor shall not be entitled to recover from the Owner, and hereby waives all rights that it or its subcontractors or any other person may otherwise have to recovery, any costs, expenses and damages of any nature that it or its subcontractors or any other person may suffer by reason of delay in the performance of the Work or any portion thereof, the extension of Contract Time granted herein being the Contractor's sole and exclusive remedy.

§ 8.3.3 The Contractor shall not be entitled to any increase in the Contract Sum, as a result of any delays in the progress of the Work. The Contractor's sole remedy for delay shall be an extension of time. This Section 8.3 does not preclude recovery of damages or delay by the Owner under other provisions of the Contract Documents.

§ 8.3.4 Notwithstanding other provisions in this Contract, Contractor shall not be entitled to any recovery of damages arising out of any event or delay caused within Contractor's control and/or for "Acts of God", including without limitation adverse weather conditions, which prevents such early completion of the Work.

§ 8.3.5 Where a delay occurs that is beyond the Contractor's control and when the delay is not reasonably unacceptable, the Contractor has an affirmative duty to mitigate the effect of that delay on the progress of the Work. An extension of the Substantial Completion date will not be granted to the extent that the Contractor breaches said duty to mitigate.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to

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the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least thirty (30) days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents. The form of Application for Payment shall be a notarized AIA Document G702, Application and Certification for Payment, supported by AIA Document G703, Continuation Sheet.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay. However, this Section will not apply to routine retainage and Contractor intends to withhold from the Subcontractor.

§ 9.3.1.3 No interest will be paid upon retention.

§ 9.3.1.4 Contractor shall submit all payment requests to the Architect for all work completed during the previous time period. Requests submitted late will not be processed until the following month. Contractor shall include the Contractor's waiver of lien for the full amount and partial subcontractor waivers of lien in the amounts of the previous payment request.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site. Contractor shall submit requisitions from suppliers and Subcontractors to substantiate the amounts requested on the Application for Payment for materials or equipment stores on or off site. The Owner shall have n responsibility or liability to the Contractor for the safekeeping of materials and equipment stored at the site or off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.3.4 The Contractor shall submit his application for payment as outlined in Section 9.3 on the first of the month, and the Owner will make payment accordingly promptly after receipt of the Architect's Certificate. Each partial payment request shall be made monthly and Contractor shall request payment of ninety percent (90%) of the portion of the Contract Sum properly allocable to labor, materials and equipment incorporated in the work less the aggregate of previous payments in each case. The Owner reserves the right to reduce retainage prior to substantial completion. Retainage shall not be reduced below 10% until all closeout documents as required in the Instruments of Service have been received, reviewed and approved by the Architect.

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§ 9.3.5 Before each certificate for payment is issued, the Contractor shall furnish to the Architect a complete statement of the amounts due to Subcontractors, parties supplying material, and for his own materials and labor, on AIA Document G702 and G702A "Application and Certificate for Payment."

§ 9.3.6 A Sworn "Contractor's Affidavit" shall be submitted with each payment request in sufficient form for the Owner to determine Contractor's right to payment and compliance with the Illinois Mechanic's Lien law. Each payment request shall include executed waivers of lien in conformity with information set forth on a properly completed Contractor's Affidavit. In the event that the Owner is satisfied with Contractor's payment procedures, the Owner may accept partial waivers of lien of Subcontractors and suppliers who were included in the immediate preceding payment. The Contractor shall submit waivers on a current basis, but the Owner may allow Subcontractors and suppliers to be not more than one payment late with their partial waivers.

§ 9.3.7 Upon giving ten (10) days notice in writing to the Contractor, the full contract retainage may be reinstated and the retention restored to the basis established in Section 9.3.4 if the manner of completion of the work and its progress do not remain satisfactory to the Owner, or if any surety of Contractor withholds its consent.

§ 9.3.8 All material necessary for the construction of this Project, delivered upon the premises, shall not be removed from the premises without written consent of the Architect.

§ 9.3.9 The Contractor's request for final payment shall include: (1) the Contractor's Final Lien Waiver in the full amount of the contract; and (2) final lien waivers in the full amount of their contracts from all subcontractors and suppliers for which final lien waivers have not previously been submitted.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

.1 defective Work not remedied;

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.2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;

.3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;

.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

.5 damage to the Owner or a Separate Contractor;

.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or

.7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.5.4 The Owner shall not be required to make payment unless in its own independent judgement it accepts the Architect's Certificate.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner. In the event the Owner elects to utilize an escrow agent, the Owner and the escrow agent may elect to make payments due the Contractor to the Contractor and its subcontractors.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any

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fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. With respect to Work enumerated on the list accompanying the Certificate of Substantial Completion, the guarantee or warranty period shall start at the time of subsequent acceptance of this Work in writing by Owner.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents. The payment shall be sufficient to increase the total payments to 95 percent of the contract sum, less such amounts s the Architect shall determine for incomplete work and unsettled claims.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

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§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.One ThousandDollars ($1,000.00) for each calendar day for each school where work is incomplete after **Substantial Completion Date and Full Occupancy and Use** of the building is not provided

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- **.1** employees on the Work and other persons who may be affected thereby;
- **.2** the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- **.3** other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

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§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall, at its sole cost and expense, promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

§ 10.2.8.1 If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.2.8.2 The Contractor, prior to commencing the work, shall submit to the Architect, in writing, a statement certifying that he is familiar with the Manual of Accident Prevention in Construction by the Associated General Contractors of America, current edition, and further that the Contractor will maintain at the project a copy of said publication and will strictly enforce the applicable requirements of same. Contractor will also state the name of the Contractor's Safety Engineer who will be responsible for enforcing all safety requirements.

§ 10.2.8.3 All Construction documents pertaining to this Work, and the joint and several phases of construction hereby contemplated, are to be governed, at all times, by applicable provisions of the Federal Law, including but not limited to the latest amendments of the following:

.1 Williams-Steiger Occupational Safety & Health Act of 1970 Public Law 91-596;

.2 Part 1910 — Occupational Safety & Health Standards, Chapter XVII of Title 29, Code of Federal Regulations;

.3 Part 1518 — Safety & Health Regulations for Construction, Chapter XIII of Title 29, Code of Federal Regulations.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 The Contractor shall not cause or permit any "Hazardous Materials" (as defined herein) to be brought upon, kept or used in or about the Projects site(s) except to the extent such Hazardous Materials: (1) are necessary for the prosecution of the Work; (2) are required pursuant to the Contract Documents; and (3) have been approved in writing by the Owner. Any Hazardous Materials allowed to be used on the Project site(s) shall be used, stored, and disposed of in writing as directed in writing by the Owner. Any Hazardous Materials allowed to be used in the Project site(s) shall be used, stored, and disposed of in compliance with all applicable laws relating to such Hazardous Materials. Any unused or surplus hazardous Materials, as well as, any other Hazardous Materials that

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have been placed, released, or discharged on the Project site(s) by the Contractor or any of its employees, agents, suppliers, or subcontractors, shall be removed from the Project site(s) at the earlier of (1) completion of the Work requiring the use of such Hazardous Materials; (2) the completion of the Work as a whole; or (3) within twenty-four (24) hours following the Owner's demand for such removal. Such removal shall be undertaken by the Contractor at its sole cost and expense and shall be performed in accordance with all applicable laws. The Contractor shall immediately notify the Owner of any release or discharge of any Hazardous Materials on the Project site(s). The Contractor shall provide the Owner with copies of all warning labels on products that the Contractor or any of its subcontractors will be using in connection with the Work, and the Contractor shall be responsible for making any and all disclosures required under applicable "Community Right to Know" or similar laws. The Contractor shall not clean or service any tools, equipment, vehicles, materials, or other items in such a manner as to cause a violation of any laws or regulations relating to Hazardous Materials. All residue and waste materials resulting from any such cleaning or servicing shall be collected and removed from the Project site(s) in accordance with all applicable laws an regulations. The Contractor shall immediately notify the Owner of any citations, orders, or warnings issued to or received by the Contractor, or of which the Contractor otherwise becomes aware, that relate to any Hazardous Materials on the Project site(s). Without limiting any other indemnification provisions pursuant to law or specified in this Agreement, the Contractor shall indemnify, defend (at the Contractor's sole cost, and with legal counsel approved by the Owner), and hold the Owner harmless from any and all claims, demands, losses, damages, disbursements, liabilities, obligations, fines, penalties, costs, and expenses for removing and remedying the effect of any Hazardous Materials on, under, from, or about the Project site(s), arising out of or relating to, directly or indirectly, the Contractor's or its subcontractor's failures to comply with any of the requirements herein. As used herein, the term "Hazardous Materials" means any hazardous or toxic substances, materials, and wastes listed in the United States Department of transportation Materials Table, or listed by the Environmental Protection Agency as hazardous substances, and all substances, materials, or wastes that are or become regulated under federal, state, or local law.

§ 10.3.3 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

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ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. Such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

.1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed including private entities performing work at the site and exempt from the coverage on account of number of employees or occupation, which entities shall maintain voluntary compensation coverage at the same limits specified for mandatory coverage for the duration of the project.

.2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees or persons or entities excluded by statute from the requirements of Section 11.1.1.1 but required by the contract documents to provide the insurance required by that Section.

.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;

.4 Claims for damages insured by usual personal injury liability coverage;

.5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;

.6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle and coverage should be written on a comprehensive automobile policy which will include coverage for owned, non-owned and hired motor vehicles.

.7 Claims for bodily injury or property damage arising out of completed operations; and

.8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

.9 Liability insurance should be written on the comprehensive general liability basis, and shall include, but not be limited to the following sub-lines:

- **a**. Premises and Operations including x, c, u coverages (explosion, collapse, underground).
- **b.** Products and Completed Operations.
- **c**. Independent Contractor's Protective.
- **d.** Broad Form Comprehensive General Liability Endorsement:
  - **1**. Contractual Liability, including contractors' obligation under Section 3.18.
  - **2.** Personal Injury & Advertising Injury Liability
  - **3.** Premises Medical Payments
  - **4.** Fire Legal Liability - Real Property
  - **5.** Broad Form Property Damage Liability (including Completed Operations)
  - **6.** Incidental Medical Malpractice Liability
  - **7.** Additional Persons Insured, including employees for personal and advertising injury.
  - **8.** Extended Bodily Injury Liability

.10 If liability insurance is written under the new simplified form - Commercial General Liability, the above listed coverages should be included.

.11 If the General Liability coverages are provided by a Commercial General Liability Policy on a claims-made basis, the policy date or retroactive date shall predate the contract; the termination date of the policy shall be no earlier than the termination date of coverages required to be maintained after final payment, certified in accordance with Section 9.10.2, and an extended period endorsement "Supplemental Tail," must be purchased.

.12 In any and all claims against the Owner or the Architect, or any of their agents or employees, by any employee or Contractor, any subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the insurance obligation under this Section shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for the Contractor or subcontractor under the Worker's Compensation Act, disability benefit acts or other employees benefits acts.

.13 The General Liability coverages shall be provided by a commercial General Liability Policy on an occurrence basis.

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§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from date of commencement of the Work until 60 days after the date of final completion or for such other period for maintenance of completed operations coverage as specified in the Contract Documents. With respect to the Contractor's completed operations coverage, until expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 The insurance required by Section 11.1.1 shall be written for not less than the following limits, or greater if required by law:

1. Workers' Compensation, Occupational Disease and Employer's Liability Insurance:
- **a.** State: Statutory limits
- **b.** Applicable Federal (e.g., Longshoremen's): Statutory limits
- **c.** Employer's Liability
  $1,000,000 Per Accident
  $1,000,000 Disease, Policy Limit
  $1,000,000 Disease, Each Employee

2A. If written under Comprehensive General Liability Policy Form (including sub-lines specified in Section 11.1.1.9)
- **a.** Bodily Injury:
  $1,000,000 Each Occurrence
  $2,000,000 Aggregate
- **b.** Property Damage:
  $1,000,000 Each Occurrence
  $2,000,000 Aggregate
- **c.** Bodily Injury and Property Damage combined:
  $1,000,000 Each Occurrence
  $2,000,000 Aggregate
- **d.** Personal Injury:
  $1,000,000 Aggregate
- **e.** Products and Completed Operations to be maintained for one year after final payment:
  $1,000,000 Aggregate
- **f.** Property Damage Liability Insurance shall provide X, C and U coverages.
- **g.** Broad Form Property Damage Coverage shall include Completed Operations.

2B. If written under Commercial General Liability Policy Form
- **a.** $2,0000,000 General Aggregate
- **b.** $1,000,000 Products Completed Operations Aggregate
- **c.** $1,000,000 Personal and Advertising Injury
- **d.** $1,000,000 Each Occurrence
- **e.** $50,000 Fire Damage (any one fire)
- **f.** $5,000 Medical Expense (any one person)

3. Contractual Liability
- **a.** Bodily Injury:
  $1,000,000 Each Occurrence
  $2,000,000 Aggregate
- **b.** Property Damage:
  $1,000,000 Each Occurrence
  $2,000,000 Aggregate

4. Personal Injury, with Employment Exclusion deleted:
- **a.** $1,000,000 Aggregate

5. Business Automobile Liability (Including owned, non-owned and hired vehicles):
- **a.** Automobile Liability:

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i. Bodily Injury:
$1,000,000 Each Person
$1,000,000 Each Occurrence

6. Umbrella Excess Liability:
a. $2,000,000 Over Primary Insurance
b. $2,000,000 Retention for Self-Insured Hazards Each Occurrence

§ 11.1.4 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness. On the Certificate of Insurance, delete in the cancellation provision the following words, 'Endeavor to' and 'but failure to mail such notice shall impose no obligation or liability of any kind upon the company, its agents or representatives.'

§ 11.1.5 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's Consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.1.6 The insurance company issuing the comprehensive general liability insurance coverage required for the performance of this contract shall be licensed to do business in Illinois with Best's Insurance Guide (current edition) rating of "A" or better and satisfactory to the Owner.

§ 11.1.7 If the insurance is written on the Comprehensive General Liability policy form, the Certificates shall be AIA Document G705, Certificate of Insurance. If this insurance is written on a Commercial General Liability policy form, ACCORD form 25S will be acceptable. These certificates shall specifically state that the Owner, his representatives, and the Architect are protected by the Contractor's insurance against all liabilities as spelled out in Par. 3.18 of AIA Doc. A201, as modified hereinabove.

§ 11.1.8 The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.9 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.10 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.2 Owner's Insurance

§ 11.2.1 The Contractor shall purchase and maintain insurance covering the Owner's contingent liability for claims which may arise from operations under the contract and that will protect the Owner and the Architect and their agents and employees from and against all claims, damages, losses and expenses including attorney's fees and all other defense costs whether in legal or administrative actions arising (a) out of or resulting from the performance of the work specifically pertaining to the Illinois Structural Works Act, provided that any such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury or to destruction of tangible property (other than the work itself) including the loss of use resulting therefrom and (b) out of any claim made by any employee of the contractor or any subcontractor or by the Illinois Department of Labor for the amount of any wages or salaries

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which should have been paid to such employees and interest thereon, fines or other assessments relating to such violation, pursuant to provisions of the Prevailing Wage Act, 820 ILCS 130/0.01 et seq., regardless of whether or not it is caused in part by a party to whom insurance is afforded pursuant to this department.

§ 11.2.2 In any and all claims against the Owner or the Architect or any of their agents or employees by any employee of the contractor, any subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the insurance obligation under this Section shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the contractor or any subcontractor under Workmen's Compensation Acts, disability benefit acts or other employee benefit acts.

§ 11.2.3 The Contractor shall give the Owner the original policy and shall furnish the Architect memorandum copies of said policy. The Owner and Architect shall be the named insureds in this Protective Liability Policy. The Contractor shall protect the Owner and the Architect and their agents and employees from expenses, including attorney's fees, arising out of or resulting from the performance sickness, disease, or death, or injury to, or destruction of any tangible property (other than the Work itself) including the loss of use therefrom that is caused in whole or in part by any negligent act or omission of the Contractor, any subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, regardless of whether it is caused in whole or in part by a party to whom insurance is afforded pursuant to this Section.

11.3 PROPERTY INSURANCE

§ 11.3.1 The Builder's Risk Insurance is required and shall be purchased and maintained by the Owner until Substantial Completion.

§ 11.3.2 The policy shall be a Completed Value All Risk Builder's Risk policy and shall cover all work (including that of all contractors) in the course of construction excluding temporary structures and materials used in the construction process stored on or within one hundred feet of the construction site and while awaiting installation. The policy shall be written in an amount equal to 100% of the total sum of all contracts. However, the policy is based on a $5,000 deductible, applicable to all loses for each occurrence. Therefore, the Contractor shall be solely responsible for any and all losses up to $5,000. Losses are adjustable with and payable to the Owner for his own account.

§ 11.3.3 Coverage shall include, but not be limited to:

- **A.** All Risk of Direct Physical Loss, including Fire and Extended Coverage (Lightning, wind storm, hail, explosion, riot, civil commotion, aircraft, vehicle and smoke).
- **B.** Vandalism and Malicious Mischief.

§ 11.3.4 Coverage shall not extend to:

- **A.** The Contractors', Subcontractors', or the Architect's/Engineer's Tools, apparatus, machinery, scaffolding, hoists, forms, staging, shoring and other similar items commonly referred to as construction equipment, which may be on the site and the capital value of which is not included in the Work.
- **B.** Property owned by employees of any of the foregoing.
- **C.** Vehicles of any kind.
- **D.** Trees and shrubs.
- **E.** Drawings and specifications.

§ 11.3.5 The policy by its terms or endorsement shall specifically permit and allow for beneficial or partial occupancy prior to completion or acceptance of the project by the Owner.

11.3.1.6 The prompt repair or reconstruction of the Work as a result of any insured loss or damage shall be the Contractor's responsibility and shall be accomplished at no additional cost to the Owner or Architect. The contractor shall furnish the proper assistance in the adjustment and settlement of any loss. Loss will be adjustable with and payable to the party purchasing the Builder's Risk Insurance who shall be responsible for apportioning the loss proceeds to each and every entity involved in the loss to the extent of his interest. The policy shall contain a provision that the policy will not be canceled, changed or altered until at least 30 calendar days prior written notice has been given to the named insured.

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§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

§ 11.6 BOILER AND MACHINERY INSURANCE

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

§ 11.7 LOSS OF USE INSURANCE

§ 11.7.1 The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

§ 11.7.2 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

§ 11.7.3 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.7.4 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.7.5 The Owner as fiduciary shall have the power to adjust and settle a loss with insurers.

§ 11.8 PERFORMANCE BOND AND PAYMENT BOND

§ 11.8.1 The Contractor shall furnish a Performance Bond and Labor and Material Payment Bond in the amount of one hundred percent (100%) of the Contract Sum. Owner requires that the bond surety must carry a BEST RATING of A+ and that the Owner has no objection to the bond surety.

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§ 11.8.2 The Contractor shall deliver the required bonds to the Owner not later than ten days following the date of notification of the Award of Contract or if the Work is to be commenced prior thereto in response to a letter of intent, the Contractor shall, prior to the commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished.

§ 11.8.3 The Contractor shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of the power of attorney. Such bonds shall be in the form of American Institute of Architect's Document A-311 or a similar form worded exactly the same as Doc. A-311 and shall bear the same date as, or a date subsequent to, the date of the Contract. The bonds shall be issued by a bonding company licensed to operate in the State of Illinois and approved by the Owner.

§ 11.8.4 The failure of the Contractor to supply the required bonds within 10 days after the prescribed Agreement forms are presented for signature, or if the bonding company finds that the Contractor is NOT bondable, shall constitute a default, and the Owner may award the Contract to the next responsible low bidder.

§ 11.8.5 If at any time the Owner becomes dissatisfied with any Surety or Sureties then upon the Bonds, or for any other reason such Bonds shall cease to be adequate security for the Owner, the Contractor shall, within five (5) days after notice to do so, substitute acceptable Bonds in such forms and sum and signed by such other Sureties as may be satisfactory to the Owner. No further payments shall be deemed due nor shall be made until the new Sureties shall have qualified.

§ 11.8.6 Whenever the Contractor shall be and is declared by the Owner to be in default under the Contract, the Surety and Contractor are each responsible to make full payment to the Owner for any and all additional services of the Architect as which are required as a result of the Contractor's default and in protecting the Owner's right under the Agreement with the Contractor.

§ 11.8.7 The Contractor must within ten (10) days after the execution of this Agreement furnish a Performance Bond agreeing to pay not less than the prevailing wage for work to be performed in accordance with the Contract and the laws of the State of Illinois, and agreeing to pay all sums of money due for labor, materials, apparatus, fixtures or machinery and transportation with respect thereto, as in said Payment Bond provided, each dated the same day as the Agreement, in the forms prescribed by the Owner and each in an amount equal to the Contract Sum with a corporate Surety or Sureties acceptable to the Owner authorized to do business in the State of Illinois. These Bonds shall be maintained by the Contractor and shall remain in full force and effect until final acceptance of the work by the Owner or sixty (60) days following the date of Final Payment, whichever occurs later. The Contractor shall agree and shall cause the Surety to agree to be bound by each and every provision of the Contract Documents.

§ 11.8.8 In the event the Surety will make any assignment for the benefit of creditors or commit any act of bankruptcy, or if it shall be declared bankrupt or if it shall file a voluntary petition in bankruptcy or shall in the opinion of the Owner be insolvent, the Contractor shall agree forthwith upon request of the Owner to furnish and maintain other corporate Surety with respect to such bonds satisfactory to the Owner.

§ 11.9 ADDITIONAL INSURANCE REQUIREMENTS

§ 11.9.1 The Contractor is responsible for determining that subcontractors are adequately insured against claims arising out of or relating to the Work. The premium cost and charges for such insurance shall be paid by each subcontractor.

§ 11.9.2 The limits of liability as stated may be arrived at using a Split-Limit or a Combined Single Limit basis. However, the total limit of liability shall not be less than that stated in the requirements.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to

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the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly at the Contractor's sole expense, after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The two-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents and pay all attorney's fees and expenses related thereto, immediately upon demand.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the two-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the

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other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.3.3 The Owner and the Architect reserve the right to accept or reject any substitutions bid upon. If substitutions are not specifically accepted in writing**,** materials specified as "standard" shall be used in construction of this project.

§ 13.3.4 Any material specified by reference to the number, symbol or title of specific standards, such as Commercial Standards, Federal Specifications, trade association standards, or similar standards, shall comply with requirements in the latest revision thereof and any amendment of supplement thereto in effect on the date of the Instruments of Service, except as limited to type, class or grade, or modified in such reference by a given date. The standards related to, except as modified in the Specifications, shall have full force and effect as though printed in the Specifications.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Contractor's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense. Notwithstanding any other term or provision in this Article 13 to the contrary, in the event that any testing or inspection of the Work or any part thereof reveals defects in materials or workmanship, then the Contractor shall remedy such defects and shall bear all costs and expenses associated with such testing which is related to determining whether such defects have been properly remedied.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

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§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.8 REGULATIONS

§ 13.8.1 The Contractor and/or Subcontractor warrant/s that s/he is familiar with and s/he shall comply with Federal, State and local laws, statutes, ordinances, rules and regulations, School Board Rules and Policies, and the orders and decrees of any courts or administrative bodies or tribunals in any manner affecting the performance of the contract including without limitation Workmen's Compensation Laws, minimum salary and wage statutes and regulations, laws with respect to permits and licenses and fees in connection therewith, laws regarding maximum working hours, and, without limitation, such other laws and regulations as are specifically described below. Additionally, Contractor and subcontractor warrant that s/he shall comply with any amendments to such Federal, State and local laws, statutes, ordinances, rules and regulations that are enacted thereafter during the performance of the Work and under this Contract. To the extent that there are any violations of any of the applicable laws, rules, regulations and/or court orders/decrees mentioned herein, Contractor and Subcontractor shall be responsible for indemnifying and holding both the Owner and Architect free and harmless from all costs, fees and expenses incurred, directly or indirectly and including without limitation attorneys' fees, by the Owner of the Architect in responding to and complying with demands made by any of the governmental departments/agencies and/or the courts, or an aggrieved employee or person and such amounts may be withheld from the payments to be made on the project. It is the intention that the Owner and Architect shall suffer no time loss or other additional expenses in complying with any inquiry made with regard to any compliance with the applicable laws, rules and regulations referenced herein. No plea of misunderstanding or ignorance thereof will be considered.

§ 13.8.1.1 Whenever required or upon the request of the Architect or Owner, the Contractor or subcontractor shall furnish the Architect and the Owner with satisfactory proof of compliance with said Federal, State and local laws, statutes, ordinances, rules, regulations, orders, and decrees.

§ 13.8.2 The Contractor and Subcontractors shall carefully examine the Occupational Safety and Health Act of 1970, published in May 1971, as issued by the Federal Register (OSHA), and the specific regulations governing procedures, techniques, safety precautions, equipment design, and the configuration of the same as required under this Act and the Contractor agrees as evidenced by his submission of a bid to comply with all terms of the Act and to perform and complete in a workmanlike manner all work required in full compliance with said Act. The Contractor is responsible to comply with OSHA and its regulations as amended in performing any work under the Contract Documents.

§ 13.8.3 The Contractor shall comply with the non-discrimination federal, state and local laws, including without limitation:

§ 13.8.3.1 Equal Employment Opportunities Act, American with Disabilities Act and Human Rights Act. The Contractor acknowledges that this Contract is subject to and governed by the rules and regulations of the Illinois Human Rights Act (the "Human Rights Act"), including the mandatory provisions that each contractor have in place written sexual harassment policies that shall include, at minimum, the following information: (i) the illegality of sexual harassment; (ii) the definition of sexual harassment under state law; (iii) a description of sexual harassment, utilizing examples; (iv) the vendor's internal complaint process including penalties; (v) the legal recourse, investigation and complaint process available through the Department and the Commission; and (vii) protection against retaliation as provided by Section 6-101 of said Act and that it has a written sexual harassment policy in place in full compliance with Section 105(A)(4) of the Human Rights Act, 775 ILCS 5/2-105(A)(4). The Contractor agrees to fully comply with the requirements of the Illinois Human Rights Act, 775 ILCS 5/1-101 et seq., including but not limited to, the provision of sexual harassment policies and procedures pursuant to Section 2-105 of the Act. The Contractor further agrees to comply with all federal Equal Employment Opportunity Laws, including, but not limited to, the Americans with Disabilities Act, 42 U.S.C. Section 12101 et seq., and rules and regulations promulgated thereunder. The provisions of Section 14.2 are included in this Amendment pursuant to the requirements of the regulations of the Illinois Department of Human Rights, Title 44, Part 750, of the Illinois Administrative Code, and Contractor shall be required to comply with these provisions only if and to the extent they are applicable under the law.

§ 13.8.3.2 As required by Illinois law, in the event of the Contractor's non-compliance with the provisions of this Equal Employment Opportunity Clause, the Illinois Human Rights Act or the Rules and Regulations of the Illinois

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Department of Human Rights ("Department"), the Contractor may be declared ineligible for future contracts or subcontracts with the State of Illinois or any of its political subdivisions or municipal corporations, and the Contract may be canceled or voided in whole or in part, and such other sanctions or penalties may be imposed or remedies invoked as provided by statute or regulation. During the performance of this Contract, the Contractor agrees as follows:

§ 13.8.3.2.1 That it will not discriminate against any employee or applicant for employment because of race, color, religion, creed, sex, marital status, national origin or ancestry, age, citizenship, physical or mental handicap or disability, military status, unfavorable discharge from military service or arrest record status: and further that it will examine all job classifications to determine if minority persons or women are underutilized and will take appropriate affirmative action to rectify any such underutilization.

§ 13.8.3.2.2 That, in all solicitations or advertisements for employees placed by it or on its behalf, it will state that all applicants will be afforded equal opportunity without discrimination because of race, color, religion, sex, marital status, national origin or ancestry, age, physical or mental handicap unrelated to ability, or an unfavorable discharge from military service.

§ 13.8.3.2.3 That it will submit reports as required by the Department's Rules, furnish all relevant information as may from time to time be requested by the Department or the contracting agency, and in all respect comply with the Illinois Human Rights Act and the Department's Rules.

§ 13.8.3.2.4 That it will permit access to all relevant books, records, accounts and work sites by personnel of the contracting agency and the Department for purposes of investigation to ascertain compliance with the Illinois Human Rights Act and the Department's Rules.

§ 13.8.3.2.5 That it will include verbatim or by reference the provisions of this clause in every subcontract it awards under which any portion of the Contract obligations are undertaken or assumed, so that such provisions will be binding upon such subcontractor. In the same manner as with other provisions of this Contract, the Contractor will be liable for compliance with applicable provisions of this clause by such subcontractors; and further it will promptly notify the contracting agency and the Department in the event any subcontractor fails or refuses to comply therewith. In addition, the Contractor will not utilize any subcontractor declared by the Illinois Human Rights Commission to be ineligible for Contractors or subcontracts with the State of Illinois or any of its political subdivisions or municipal corporation.

§ 13.8.4 Illinois Department of Labor Requirements and Prevailing Wage Act.

§ 13.8.4.1 Contractor agrees to comply with and that this agreement is subject to and governed by the Illinois Prevailing Wage Act (820 ILCS 130/0.01 et seq.). The Contractor shall ensure that any Subcontractors shall comply with the Illinois Prevailing Wage Act. Contractor and Subcontractors shall include in Bids the cost for the current prevailing wage. As changes are made in these prevailing wages, the Contractor and Subcontractors performing work on the project will be responsible for conforming to the changes and shall have the responsibility for determining when changes are made. No additional costs are to be incurred by the Owner as a result of changes in the prevailing wage. All record keeping requirements are the obligation of the Contractor and Subcontractors.

§ 13.8.4.2 To the extent that there are any violations of the Prevailing Wage Act and any demands are made upon the Owner, Contractor or Architect by the Illinois Department of Labor or by any employee of the Contractor or a Subcontractor performing work on the project, the Contractor or the particular Subcontractor and Contractor shall be responsible for indemnifying and holding the Owner, Contractor and Architect free and harmless from all costs incurred, directly or indirectly, by the Owner, Contractor or Architect in responding to and complying with demands made by the Department of Labor, or an aggrieved employee and such amounts may be withheld from the payments to be made on the project. It is the intention that the Owner, Contractor and Architect shall suffer no time loss or other additional expenses in complying with any inquiry made with regard to this Act.

§ 13.8.4.3 It shall be mandatory upon the Contractor and upon any Subcontractors thereof to pay all laborers, workman, and mechanics employed by them not less than the prevailing wages in the locality for each craft or type of workman or mechanic needed to perform such work and the general prevailing rate for legal holidays and

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overtime work as ascertained by the Illinois Department of Labor and pursuant to Illinois law and statutes in such case made and provided.

§ 13.8.4.4 The Contractor and each Subcontractor shall (1) make and keep, for a period not less than 3 years, records of all laborers, mechanics, and other workers employed by them on the project; the records shall include each worker's name, address, telephone number when available, social security number, classification or classifications, the hourly wages paid in each pay period, the number of hours worked each day, and the starting and ending times of work each day; and (2) submit monthly, in person, by mail, or electronically a certified payroll to the Owner in charge of the project. The certified payroll shall consist of a complete copy of the records identified in the Prevailing Wage Act. The certified payroll shall be accompanied by a statement signed by the Contractor and/or Subcontractor which avers that: (i) such records are true and accurate; (ii) the hourly rate paid to each worker is not less than the general prevailing rate of hourly wages required by the Prevailing Wage Act; and (iii) the Contractor and/or Subcontractor is aware that filing a certified payroll that he or she knows to be false is a Class B misdemeanor. Contractor is not prohibited from relying on the certification of a lower tier Subcontractor, provided the Contractor does not knowingly rely upon a Subcontractor's false certification. Any Contractor and/or Subcontractor subject to the Prevailing Wage Act who fails to submit a certified payroll or knowingly files a false certified payroll is in violation of the Prevailing Wage Act and guilty of a Class B misdemeanor. The records submitted in accordance with the Prevailing Wage Act herein shall be considered public records, except an employee's address, telephone number, and social security number, and made available in accordance with the Freedom of Information Act.

§ 13.8.4.5 Upon 2 business days' notice, the Contractor and each Subcontractor shall make available for inspection the records identified in the Prevailing Wage Act to the Owner in charge of the project, its officers and agents, and to the Director of Labor and his deputies and agents. Upon 2 business days' notice, the Contractor and each Subcontractor shall make such records available at all reasonable hours at a location within this State.

§ 13.8.5 Public Contract Fraud Act. Contractor agrees to comply with and that this agreement is subject to and governed by the Illinois Public Contract Fraud Act (30 ILCS 545/0.01).

§ 13.8.6 Public Construction Contract Act. Contractor agrees to comply with and that this agreement is subject to and governed by the Illinois Construction Contract Act (30 ILCS 557/1).

§ 13.8.7 Public Construction Bond Act. Contractor agrees to comply with and that this agreement is subject to and governed by the Illinois Public Construction Bond Act (30 ILCS 550/0.01). If the Contractor furnishes material or labor on the project, or assume any Contracts for material or labor awarded or entered into by the Owner, Contractor first shall supply and deliver to Owner a bond conditioned upon the completion of the Contract, and the payment of such material and labor, as required by the Illinois Public Construction Bond Act. 30 ILCS 550/1 et seq.

§ 13.8.8 Public Works Preference Act. Contractor agrees to comply with and that this agreement is subject to and governed by the Illinois Public Works Preference Act (30 ILCS 560/0.01).

§ 13.8.9 Employment of Illinois Workers on Public Works Act. Contractor agrees to comply with and that that his agreement is subject to and governed by the Illinois Employment of Illinois Workers on Public Works Act (30 ILCS 570/0.01).

§ 13.8.10 Public Works Contract Change Order Act. Contractor agrees to comply with and that this agreement is subject to and governed by the Illinois Public Works Contract Change Order Act (50 ILCS 525/1).

§ 13.8.11 Local Government Professional Services Selection Act. Contractor agrees to comply with and that this agreement is subject to and governed by the Illinois Local Government Professional Services Selection Act (50 ILCS 510/0.01).

§ 13.8.12 Veterans Preference Act. The Contractor agrees to comply with and that this agreement is subject to and governed by the Illinois Veterans Preference Act (330 ILCS 55/0.01) that, in the employment and appointment to fill positions in the construction, addition to, or alteration of all public works undertaken or contracted for by the State, or by any political subdivision thereof, preference shall be given to persons who have been members of the armed forces of the United States or who, while citizens of the United States, were members of the armed forces of allies of

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the United States in time of hostilities with a foreign country, and have served under one or more of the following conditions: (1) the veteran served a total of at least 6 months, or (2) the veteran served for the duration of hostilities regardless of the length of engagement, or 3) the veteran served in the theater of operations but was discharged on the (4) the veteran was released from active duty basis of a hardship, or because of a service connected disability and was honorably discharged. But such preference shall be given only to those persons who are found to possess the business capacity necessary for the proper discharge of the duties of such employment. No political subdivision or person contracting for such public works is required to give preference to veterans, not residents of such district, over residents thereof, who are not veterans.

§ 13.8.12.1 "Time of Hostilities with a foreign country" means any period of time in the past, present, or future during which a declaration of war by the United States Congress has been or is in effect or during which an emergency condition has been or is in effect that is recognized by the issuance of a Presidential proclamation or a Presidential executive order and in which the armed forces expeditionary medal or other campaign service medals are awarded according to Presidential executive order.

§ 13.8.12.2 "Armed Forces of the United States" means the United States Army, Navy, Air Force, Marine Corps, Coast Guard. Service in the Merchant Marine that constitutes active duty under Section 401 of federal Public Law 95 202 shall also be considered service in the Armed Forces of the United States for purposes of this Section.

§ 13.8.13 Drug Free Workplace. The Contractor certifies by the execution of this Contract that the Contractor will provide a drug free workplace in compliance with the Illinois Drug Free Workplace Act (30 ILCS 580/1 et seq.), including provision of providing notifications, imposing sanctions, providing assistance with counseling, and complying with all other requirements of said Act.

§ 13.8.14 Bid Rigging and Rotating. The Contractor certifies that the Contractor is in compliance with Illinois law and not barred from bidding on the Contract as a result of a conviction for either bid rigging or bid rotating under Article 33E of the *Criminal Code of 1961* (720 ILCS 5/33E).

§ 13.8.15 No Smoking. In accordance with the state (105 ILCS 5/10-20.5b) and federal law and Board of Education Policy, smoking is prohibited on all School District property.

§ 13.8.16 Concurrent with the execution of this Contract, the Contractor has executed the Certificate of Eligibility.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Owner for Cause

§ 14.1.1 If the Contractor shall institute proceedings or consent to proceedings requesting relief or arrangement under the Federal Bankruptcy Act or any similar or applicable federal or state law, or if a petition under any federal or state bankruptcy or insolvency law is filed against the Contractor and such petition is not dismissed within sixty (60) days after the date of said filing, or if the Contractor admits in writing his inability to pay his debts generally as they become due, or if he makes a general assignment for the benefit of his creditors, or if a receiver, liquidator, trustee or assignee is appointed on account of his bankruptcy or insolvency; or if a receiver of all or any substantial portion of the Contractor's properties is appointed; or if the Contractor abandons the Work; or if he fails, except in cases for which extension of time is provided, to prosecute promptly and diligently the Work or to supply enough properly skilled workmen or proper materials for the Work; or if he submits an Application for Payment, sworn statement, waiver of lien, affidavit or document of any nature whatsoever which is intentionally falsified; or if he fails to make prompt payment to Subcontractors or for materials or labor or otherwise breaches his obligations under any subcontract with a Subcontractor; or if a mechanic's or material man's lien or notice of lien is filed against any part of the Work or the site of the Project and not promptly bonded or insured over by the Contractor in a manner satisfactory to the Owner; or if the Contractor disregards any laws, statutes, ordinances, rules, regulations or orders of any governmental body or public or quasi-public authority having jurisdiction of the Work or the site of the Project; or if he otherwise violates any provision of the Contract Documents; then the Owner, without prejudice to any right or remedy available to the Owner under the Contract Documents or at law or in equity, the Owner may, after giving the Contractor and the surety under the Performance Bond and under the Labor and Material Payment Bond described in Section 11.5, seven (7) days' written notice, terminate the employment of the Contractor. If requested by the Owner, the Contractor shall remove any part or all of his equipment, machinery and supplies from the site of the Project within seven (7) days after the date of such request, and in the event of the Contractor's failure to do so, the Owner shall have the right to remove or store such equipment, machinery and supplies at the

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Contractor's expense. In case of such termination, the Contractor shall not be entitled to receive any further payment for Work performed by the Contractor through the date of termination. The Owner's right to terminate the Owner-Contractor Agreement pursuant to this Section 14.2.1 shall be in addition to and not in limitation of any rights or remedies existing hereunder or pursuant hereto or at law or in equity.

§ 14.1.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.1.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.1.4 If the unpaid balance of the Contract Sum exceeds all costs to the Owner of completing the Work, then the Contractor shall be paid for all Work performed by the Contractor to the date of termination. If such costs to the Owner of completing the Work exceed such unpaid balance, the Contractor shall pay the difference to the Owner immediately upon the Owner's demand. The costs to the Owner of completing the work shall include (but not be limited to) the cost of any additional architectural, managerial and administrative services required thereby, any costs incurred in retaining another contractor or other subcontractors, any additional interest or fees which the Owner must pay by reason of a delay in completion of the Work, attorneys' fees and expenses, and any other damages, costs and expenses the Owner may incur by reason of completing the Work or any delay thereof. The amount, if any, to be paid to the Contractor shall be certified by the Architect, upon application, in the manner provided in Section 9.4, and this obligation for payment shall survive the termination of the Contract.

§ 14.1.5 The Owner may, upon seven (7) days written notice to the Contractor, terminate the Agreement between the Owner and Contractor without cause. Upon written request and submittal of the appropriate documentation as required by the Owner, the Owner shall pay the Contractor for all work performed by the Contractor to the date of termination that has been approved by the Owner. The Owner may, upon the Contractor executing such a confirmatory assignments as the Owner shall request, accept and assume all of the Contractor's obligations under all subcontracts executed in accordance with the terms of the Contract Documents that may accrue after the date of such termination and that the Contractor has incurred in good faith in connection with the Work. Upon receipt of notice of termination, the Contractor shall cease all operations on the date specified by the Owner, terminate subcontracts not assumed by the Owner, make no further orders of materials or equipment, complete work not terminated (if any), and provide such reports as may be requested by the Owner and the Architect as to the status of the Work and the Work remaining to be completed. The Owner's right to terminate the Contract under this Section shall be in addition to, and not in limitation of, its rights to stop the Work without terminating the Contract.

§ 14.2 Suspension by the Owner for Convenience

§ 14.2.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.2.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

.1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.3 Termination by the Owner for Convenience

§ 14.3.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

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§ 14.3.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.3.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties to the contract seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Notice of Claims

§ 15.1.2.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.2.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.3 Continuing Contract Performance

§ 15.1.3.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.3.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.4 Claims for Additional Cost

If the Contractor wishes to make a claim for an increase in the Contract Sum, written notice as provided herein shall be given within seven (7) calendar days after the event giving rise to the claim and before proceeding to execute the Work. The Contractor's claim shall include an estimate of cost and of probable effect of the delay on the progress of the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5 Claims for Additional Time

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

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§ 15.1.5.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

§ 15.1.6 Waiver of Claims for Consequential Damages

The Contractor waives Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.7 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

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ARTICLE 16 LIMT TO AVOID INCORPORATION OF RESPONSIBILITY BY REFERENCE

§ 16.1 Where any specification which is incorporated herein by reference, through the words "and/or as directed by the Architect," or phrases having a similar effect appear to give the Architect the right to direct something other than that specified, the Architect has in fact no such right to except as it may be established in specific instances in portions of this Instruments of Service other than in said specifications.

ARTICLE 17 INCORPORATION OF CONTRACT TERMS WITH SUBCONTRACTORS

§ 17.1 Contractor agrees that s/he will be responsible to incorporate all of the terms and conditions herein, including all amendments to this Contract, with any and all of the Subcontractors as well as any Subcontractors retained by Subcontractors. Contractor acknowledges that it is the Owner's intent that all of the terms and conditions herein, including all amendments to this Contract, will be adhered to by the Contractor and all Subcontractors performing any Work in this project.

Board of Education of _____

Signature:_____ ATTEST:_____

Title:_____ Title:_____

Date:_____

Contractor:

_____

Signature:_____ ATTEST:_____

Title:_____ Title:_____

Date:_____

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SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
1. Project Information.
2. Work covered by Contract Documents.
3. Access to site.
4. Owner's occupancy requirements.
5. Work restrictions
6. Specification and drawing conventions
7. Miscellaneous provisions.

1.3 PROJECT INFORMATION

A. Project Identification: Renovations and Improvements

1. Project Locations:
Deer Path Elementary School
2211 Crystal Lake Road
Cary, Illinois 60013

Three Oaks Elementary School
1514 Three Oaks Road
Cary, Illinois 60013

2. Owner:
Cary Community Consolidated School District 26
2115 Crystal Lake Road
Cary, Illinois 60013

3. Owner's Representative:
Mr. David Martin
Operations Manager
Cary Community Consolidated School District 26
Administrative Center
2115 Crystal Lake Road
Cary, Illinois 60013

4. Architect:
   Cashman Stahler Group
   1910 S. Highland Avenue, Suite 310
   Lombard, Illinois 60148

1.4 WORK COVERED BY CONTRACT DOCUMENTS (GENERAL)

A. The overall Scope of Work to be provided by the Contractor at the Deer Path Elementary School and Three oaks Elementary School and coordinated on behalf of Owner includes, but is not limited to, the following:

   1. Select interior renovations and improvements.
   2. Select exterior entrance renovations and exterior masonry restoration.

B. Type of Contract: The Owner is soliciting bid proposals from General Contractors for the work indicated in the Contract Documents. The Project will be constructed under a single contract. The General Contractor will be responsible for performing all of the specified scope of work and retaining the services of subcontractors to perform the associated scope of work.

1.5 TENTATIVE PROJECT TIMELINE

A. Project Commencement: Owner may provide authorization for commencement of shop drawing preparation prior to Board of Education approval, issuance of Notice to Proceed, and the fully executed Agreement.

B. Onsite Construction: Site mobilization commencing on or before Jume 1, 2026. Construction/demolition activities commencing on or before June 3, 2026.

C. Construction Substantial Completion: Construction scope of work complete and available for Owner occupation and Regional Office of Education occupancy permit inspection on or before August 7, 2026.

D. Construction Final Completion: Within thirty (30) days of issuance of final project punch list.

1.6 ACCESS TO SITE

A. General: Contractor shall have limited use of premises for construction operations as indicated on Drawings by the Contract limits.

B. Use of Site: Limit use of premises to areas where scope of work is indicated. Do not enter, use or disturb portions of Project site beyond areas in which the Work is indicated.

   1. Limits: Confine construction operations to the areas of the site and building made available for the work of this Contract and limit access to work areas which are not occupied by the Owner or occupants.

2. Building Access: Access to the interior building areas will be coordinated with the Owner. Access will not be provided to areas outside the Project work areas unless specifically permitted by the Owner's Representative.

3. Owner Occupancy: Allow for uninterrupted Owner access, occupancy and use of the areas within, surrounding and outside the Project work areas. No student or instructional staff will be occupying or present in the building. Sequence use of the areas as required to avoid the disruption or endangerment of the Owner's personnel.

1.7 OWNER'S OCCUPANCY REQUIREMENTS

A. Owner Occupancy: Owner will occupy portions of the site and existing building during the entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits, unless otherwise indicated.

1. Maintain access to existing roadways, parking lots, pedestrian walkways, building entrances and other occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without coordinating with the Owner, Owner's Contractors, and authorities having jurisdiction.
2. Provide not less than 48 hours' notice to Owner of activities (electrical service shutdowns) that will affect Owner's operations.

B. Owner's Contractor Occupancy: Owner will be retaining the services of a Contractor for the audio/intercom system replacement. These Contractors will occupy portions of the site and existing building during the entire construction period. Cooperate with Owner during construction operations to minimize conflicts and Owner's Contractor usage.

1.8 WORK RESTRICTIONS

A. On-Site Work Hours: Limit work to normal business working hours (7:00 a.m. to 5:00 p.m.) Monday through Friday, unless otherwise directed and in accordance with all limitations of local governing authorities

1. Weekend Hours: Access to the site areas during the weekend may be permitted if arrangements are made with the Owner's Representative well in advance.

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
1. Notify not less than two days in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions.

C. Noise, Vibration, Dust and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy or the neighbors with the Owner.
1. Notify Owner not less than two days in advance of proposed disruptive operations.
2. Obtain Owner's written permission before proceeding with disruptive operations.
3. Comply with all dust control measures in the Contract Documents. Refer to the General Notes, Specifications, and governing NIOSH and OSHA documents and regulations.

D. Controlled Substances: Smoking is not permitted within the buildings or on District property in accordance with State of Illinois law.

E. Employee Identification: Owner may elect to provide identification tags for Contractor personnel working on the Project site. Require personnel to use identification tags at all times.

F. Employee Screening: Owner may elect to perform background screening of all Contractor personnel before they are permitted on District property.

G. Daily Personnel Log: Contractor will maintain a daily sign-in log of all personnel present on the project site each day. The log will be issued monthly to the Owner / Architect along with the Contractor's application for payment for review and confirmation of Contractor's certified payrolls.

1.9 OWNER-FURNISHED/CONTRACTOR-INSTALLED (OFCI) PRODUCTS

A. Owner's Responsibilities: Owner will furnish products indicated and perform the following, as applicable:

1. Provide to Contractor Owner-reviewed Product Data, Shop Drawings, and Samples.
2. Provide for delivery of Owner-furnished products to Project site.
3. Upon delivery, inspect, with Contractor present, delivered items.
    a. If Owner-furnished products are damaged, defective, or missing, arrange for replacement.
4. Obtain manufacturer's inspections, service, and warranties.
5. Inform Contractor of earliest available delivery date for Owner-furnished products.

B. Contractor's Responsibilities: The Work includes the following, as applicable:

1. Designate delivery dates of Owner-furnished products in Contractor's construction schedule, utilizing Owner-furnished earliest available delivery dates.
2. Review Owner-reviewed Product Data, Shop Drawings, and Samples, noting discrepancies and other issues in providing for Owner-furnished products in the Work.
3. Receive, unload, handle, store, protect, and install Owner-furnished products.
4. Make building services connections for Owner-furnished products.
5. Protect Owner-furnished products from damage during storage, handling, and installation and prior to Substantial Completion.
6. Repair or replace Owner-furnished products damaged following receipt.

C. Owner-Furnished/Contractor-Installed (OFCI) Products:

1. Toilet room and Classroom accessories (Dispensers).

1.10 OWNER-FURNISHED/OWNER-INSTALLED (OFOI) PRODUCTS

A. The Owner will furnish and install products indicated.

B. Owner-Furnished/Owner-Installed (OFOI) Products:

1. Audio enhancements clock/speaker communications system.
2. Flat-panel monitors (wall mounted).

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012100 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements governing allowances.

1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.

B. Types of allowances include the following:

1. Contingency Allowances.
2. Product / Scope Allowances

C. Related Sections include the following:

1. Division 01 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders for allowances.
2. Divisions 02 through 49 Sections for items of Work covered by allowances.

1.3 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Architect from the designated supplier.

1.4 ACTION SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

1.5 INFORMATIONAL SUBMITTALS

A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.6 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.7 CONTINGENCY ALLOWANCES

A. Use the contingency allowance only as directed by Architect for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.

B. Contractor's insurance, overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include, but are not limited to, delivery, installation, equipment rental, and similar costs.

C. Change Orders authorizing use of funds from the contingency allowance will include only the cost of the work requested by the Owner and all of the Contractor's related costs including insurance, overhead and profit.

D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.8 UNUSED MATERIALS

A. Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

1. If requested by Architect, prepare unused material for storage by Owner when it is not economically practical to return the material for credit. If directed by Architect, deliver unused material to Owner's storage space. Otherwise, disposal of unused material is Contractor's responsibility.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF CONTINGENCY ALLOWANCES

A. **Allowance Number One: General Construction:** Include One Twenty Thousand Dollars ($120,000) for any additional construction scope of work the Owner may have the Contractor perform.

B. **Allowance Number. Two: Roofing Contractor**: Include Twenty Thousand Dollars ($20,000) for the labor costs associated with the installation of the new TV units furnished by the Owner.

1. The Contractor will retain the services of a Firestone/Elevate Certified Roofing Contractor to perform all roofing work noted on the Contract Documents.

2. Roofing scope of work covered by this allowance EXCLUDES all selective roofing system removal and new roofing system installation associated with the following:
   a. Mechanical Equipment Curb (Deer Path School Chiller Unit).
   b. Skylight Curb (Deer Path School and Three Oaks School)

C. **Allowance Number Three: Door Hardware Allowance**: Include Two Hundred Forty Thousand Dollars ($240,000) for the material costs associated with the door hardware to be furnished by the Hardware Supplier for installation by the Contractor.

1. Owner will retain the Hardware Supplier.

D. **Allowance Number Four: Wireless Door Hardware Allowance**: Include Two Hundred and Eighty Thousand Dollars ($280,000) for the material and labor costs associated with furnishing wireless electronic mortise locksets. Door mortise locket hardware will be provided to the Bidder for installation.

1. Owner will retain the Hardware Supplier.

E. **Allowance Number Five: Wireless Door Hardware System Integration**: Include One Hundred and Seventy Thousand Dollars ($170,000) for the material and labor costs of furnishing, installing and integrating and programming of the wireless lockset operating system at Deer Path School and Three Oaks School.

1. Owner will retain the wireless system integrator.

2. Owner has retained Pace Systems as the hardware provider and system integrator.

F. **Allowance Number Six: Sound System**: Include Fifty Thousand Dollars ($50,000) for the labor costs associated with the furnishing and installing a new sound system (Deer Path School Gymnasium).

G. **Allowance Number Seven: New Flooring**: Include Seventy Thousand Dollars ($70,000) for the labor costs associated with the furnishing and installing a new flooring.

3.4 SCHEDULE OF MATERIAL ALLOWANCES

A. **Product Allowance Number Eight: Sprinkler Heads:** Provide scope of services required to relocate existing acoustical ceiling system mounted sprinkler head to accommodate new acoustical ceiling tile system, lighting fixture, and ceiling mounted device location and configuration.

1. **Description:** Scope of services is in addition to the scope of fire suppression system scope of work indicated on the contract documents.
2. **Location:** Three Oaks School
3. **Quantity**: Twenty Five (25).

B. **Product Allowance: Number Nine: Receptacle Cover Plate Replacement**: Provide scope of services to remove and replace existing plastic electrical receptacle cover plates with stainless steel receptacle cover plates.

1. **Location:** Three Oaks School
2. **Quantity:** Five Hundred (500).

C. **Product Allowance: Number Ten: Visual Display**: Provide scope of services required for furnishing and installing the following visual displays.

1. **Description:** Scope of services is in addition to the scope of visual display unit scope of work indicated on the contract documents.
2. **Quantities**.
   a. Markerboard (MB6): Twelve (12).
   b. Tackboard (TB4): Eighteen (18).
   c. Tackstrip (TS): Five Hundred (500) LF.

END OF SECTION 012100

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.

2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

3. Include all overhead, profit, bonds, insurance, general conditions, labor, materials, and all required work in each alternate bid amount.

B. Alternate Bid Agreement: The Owner will execute a separate Owner/Contractor Agreement for the Alternate Bid One scope of work. The associated scope of work will be administrated by the Owner’s environmental consultant.

1.4 PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate Bid Number One: Courtyard Window Replacement (Three Oaks School)

1. Type of Alternate Bid: **ADD** (This alternate bid is an **ADD** alternate and **IS NOT INCLUDED** in the Lump Sum Base Bid.)

2. Description: Provide all labor and material associated with the removal and replacement of the existing courtyard hollow metal window openings and doors with aluminum windows and door systems. Refer to the Drawings and the Specifications for additional information and requirements.

    a. Location: Three Oaks School

END OF SECTION 012300

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

B. Related Sections include the following:

1. Division 01 Section "Allowances" for administrative requirements for handling allowances.
2. Division 01 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, AIA Document G710, "Architect's Supplemental Instructions.

1. The Contractor shall provide a written response to any Architect’s Supplemental Instructions for which he believes there are Contract Sum or Contract Time adjustments.
2. The Contractor’s written response must be issued within ten (10) business days after receipt of the Architects’ Supplemental Instructions. The Contractor will not be entitled to a Contract Sum or Contract Time adjustment if a written response is not issued within ten (10) business days.
3. The Architect will issue a Proposal Request for any Architect’s Supplemental Instruction the Contractor deems to have Contract Sum or Contract Time implications.

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
2. Within ten (10) business days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
c. Include costs of labor and supervision directly attributable to the change.
d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Division 01 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.
7. Refer to the Supplementary Conditions for the time limits on Contractor-Initiated Proposals.
   a. Proposal Request For: Use AIA Document G709 for Proposal Requests.
8. Provide a Change Proposal and/or notify the Owner or written notice to the Architect within ten (10) business days of identifying the unforeseen condition or supplemental scope requirements and prior to the commencement of any modifications.

C. Proposal Request Form: Use AIA Document G709 for all Proposal Requests.

1.5 ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, base each Change Order proposal on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

1. Include installation costs in purchase amount only where indicated as part of the allowance.
2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the Purchase Order amount or Contractor's handling, labor, installation, overhead, and profit. Submit claims within ten (10) business days of receipt of the Change Order or Construction Change Directive authorizing work to proceed. Owner will reject claims submitted later than ten (10) business days after such authorization.

1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

1.6 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.7 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

1. The Contractor must create and maintain a daily sign-in log and have all workers sign-in and sign-out each day they visit the project site. The daily sign-in log must be submitted along with the Certified Payroll.

2. Application for Payment will not be reviewed until the Architect receives copies of the Contractor's Certified Payroll in accordance with 820 ILCS 130/5(a)(2) and the Contractor's daily sign-in log.

B. Related Sections include the following:

1. Division 01 Section "Allowances" for procedural requirements governing the handling and processing of allowances.
2. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
3. Division 01 Section "Unit Prices" for administrative requirements governing use of unit prices.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with Continuation Sheets.

b. Submittal Schedule.

c. Contractor’s Construction Schedule.

2. Submit the Schedule of Values to Architect at earliest possible date but no later than seven (7) days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the Schedule of Values:

   a. Project name and location.
   b. Name of Architect.
   c. Architect's project number.
   d. Contractor's name and address.
   e. Date of submittal.

2. Submit draft of AIA Document G703 Continuation Sheets.
3. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:

   a. Related Specification Section or Division.
   b. Description of the Work.
   c. Name of subcontractor.
   d. Name of manufacturer or fabricator.
   e. Name of supplier.
   f. Change Orders (numbers) that affect value.
   g. Dollar value.

4. Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
5. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.
6. Include separate line items under required principal subcontracts for operation and maintenance manuals, punch list activities, Project Record Documents, and demonstration and training in the amount of 5 percent of the Contract Sum.
7. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
8. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

   a. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.

9. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
10. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
11. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.

12. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.

C. Application for Payment Drafts (Pencil Copies): Draft or pencil copies of all applications shall be issued not less than seven (7) business days in advance of the Payment Application Time to insure payment is processed.

D. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.

E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
3. Indicate retainage amount specified in the Supplementary Conditions.

F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Submit Final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien. The Contract value on the Schedule of Values for each subcontractor, supplier, and prime contractor contracts and the final waivers will need to match.
5. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.

G. Certified Payroll: With each Application for Payment, submit certified payrolls for each of the contractor's own personnel and for each subcontractor's personnel employed by them performing work on the project site for the period covered by the Application for Payment.

1. The certified payroll shall consist of a complete copy of the records identified in the Prevailing Wage Act, and as specified in the Contract Documents.

H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of Values.
3. Contractor's Construction Schedule.
4. Submittal Schedule.
5. List of Contractor's staff assignments.
6. Certificates of insurance and insurance policies.
7. Performance and payment bonds.

I. Application Transmittal: Each Application for Payment submission shall be to the Architect and shall include ALL of the following documents in a single envelope. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

1. Three (3) signed and notarized original copies of Application for Payment.

2. Three (3) original copies of Waivers of Lien.

3. Three (3) copies of Certified Payroll. Collated and organized in by date.

J. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

K. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Updated final statement, accounting for final changes to the Contract Sum.
3. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims".
4. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
5. AIA Document G707, "Consent of Surety to Final Payment."
6. Evidence that claims have been settled.
7. Final, liquidated damages settlement statement.

1.6 PROGRESS PAYMENT PROCEDURE

1. Monthly progress payments will be made, if requested, upon arrival to the Owner, if in his judgment such payments are warranted on the following basis:

   .a First Payment - For cost of materials delivered to job site, less 10% retainage.

   .b Subsequent Payments - Upon documentation of progress, less 10% retainage.

   .c Substantial Completion - Upon substantial completion of the work, the contractor may apply for the reduction in retainage to 5% for all or select portions of the work. Reduction in retainage to 5% for all or select portions of the work is at the Owner or Architect's discretion.

   .d Final Completion - The Contractor may apply for the 5% retainage upon satisfactory completion of the punch list and all final completion requirements. Full payment (in whole or in part) for all or select portions of the work is at the Owner or Architect's discretion.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Project Management: The Contractor's Project Superintendent and/or a Project Manager will maintain a temporary office within one of the two project buildings and will be onsite (in District) at all times construction activities are being performed and subcontractors and vendors are on a project site.

B. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. Administrative and supervisory personnel.
2. Project meetings.
3. Requests for Interpretation (RFIs).

C. Each contractor shall participate in coordination requirements. Certain areas of responsibility will be assigned to a specific contractor.

D. Related Sections include the following:

1. Division 01 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
2. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

1.4 COORDINATION

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.
9. Project closeout activities.

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.5 SUBMITTALS

A. Key Personnel Names: Within ten (10) business days after execution of the Agreement, submit a list of key personnel assignments, including manager and superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1.6 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

A. General: In addition to Project superintendent and Project manager, provide other administrative and supervisory personnel as required for proper performance of the Work.

1.7 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.

3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within five (5) days of the meeting.

B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than ten (10) business days before the commencement of the work. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.

1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Tentative construction schedule.
    b. Critical work sequencing and long-lead items.
    c. Designation of key personnel and their duties.
    d. Procedures for processing field decisions and Change Orders.
    e. Procedures for RFIs.
    f. Procedures for processing Applications for Payment.
    g. Submittal procedures.
    h. Preparation of record documents.
    i. Use of the premises and existing building.
    j. Work restrictions.
    k. Owner's occupancy requirements.
    l. Responsibility for temporary facilities and controls.
    m. Construction waste management and recycling.
    n. Parking availability.
    o. Office, work, and storage areas.
    p. Equipment deliveries and priorities.
    q. Security.
    r. Progress cleaning.
    s. Working hours.

3. Minutes: Record and distribute meeting minutes.

C. Progress Meetings: Conduct progress meetings at weekly intervals and/or at intervals requested by the Owner or Architect. Coordinate dates of meetings with preparation of payment requests.

1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

    a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be

expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

1) Review schedule for next anticipated progress until next meeting and overall project progress and project completion date.

b. Review present and future needs of each entity present, including the following:
   1) Sequence of activities.
   2) Status of submittals.
   3) Access.
   4) Deliveries
   5) Work hours.
   6) Progress cleaning.
   7) Quality and work standards.
   8) Status of correction of deficient items.
   9) Field observations.
   10) RFIs.
   11) Status of proposal requests.
   12) Pending changes.
   13) Status of Change Orders.

3. Minutes: Record the meeting minutes and distribute to all meeting attendees. Meeting minute shall be in format acceptable to Architect and Owner.
4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
   a. Scheduling Update: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

1.8 REQUESTS FOR INTERPRETATION (RFIs)

A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.

1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of RFI: Include a detailed, legible description of item needing interpretation and the following:.

1. Project name
2. Date.
3. Name of Contractor.
4. Name of Architect.
5. RFI number, numbered sequentially.
6. Specification Section number and title and related paragraphs, as appropriate.
7. Drawing number and detail references, as appropriate.
8. Field dimensions and conditions, as appropriate.

9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
10. Contractor's signature.
11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.

C. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow five (5) business days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.

1. The following RFIs will be returned without action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for coordination information already indicated in the Contract Documents.
    d. Requests for adjustments in the Contract Time or the Contract Sum.
    e. Requests for interpretation of Architect’s actions on submittals.
    f. Incomplete RFIs or RFIs with numerous errors.

2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."

    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within five (5) business days of receipt of the RFI response.

D. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within five (5) business days if Contractor disagrees with response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly as part of each Construction Progress Meeting.

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were dropped and not submitted.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.
8. Identification of related Minor Changes in the Work, Construction Change Directive,a nd Proposal Request, as appropriate.
9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. All submittals must be submitted electronically unless actual product samples and materials. The Contractor is responsible for scanning all necessary submittals to an Adobe Acrobat PDF format.

C. Related Sections include the following:

1. Division 01 Section "Payment Procedures" for submitting Applications for Payment and the Schedule of Values.
2. Division 01 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes and for submitting Coordination Drawings.
3. Division 01 Section "Closeout Procedures" for submitting warranties.
4. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
5. Divisions 02 through 49 Sections for specific requirements for submittals in those Sections.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Architect's responsive action.

B. Informational Submittals: Written information that does not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTAL PROCEDURES

A. General: Electronic copies of CAD Drawings of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.

B. Electronic Submittals: All submittals, with the exception of physical samples or color selections, must be submitted in electronic format using Adobe Acrobat 6.0 or later format.

1. Transit all submittals via email to the Architect.

2. Transmit each submittal via a separate individual email with the email subject listing the project number, date of the submittal, and the submittal number in the following format:
    a. Submittal format: Architect Project Number/Specification Section - Submittal Number (for example, CSG673 Submittal 213250-01)

3. Hard copy submittals (other than physical samples) will be returned to the Contractor with no action taken for resubmittal in electronic format.

C. Number of Copies:

1. Electronic Submittals: Submit via email, one (1) copy. The Architect will return one (1) marked-up copy to the Contractor via email.

2. Physical Samples: Submit three (3) samples.
    a. The Architect will return one (1) marked-up sample to the Contractor.
    b. The Architect reserves the right to return color selections of physical sample submittals as Adobe Acrobat PDF format files containing annotated digital photographs or scans of the physical samples.

D. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

E. Submittal Schedule: Comply with requirements in Division 01 Section “Construction Progress Documentation” for list of submittals and time requirements for scheduled performance of related construction activities.

F. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow ten (10) business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Resubmittal Review: Allow ten (10) business days for review of each resubmittal.
3. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow fifteen (15) business days for initial review of each submittal.

    a. Architect will provide a complete list of product submittals to have sequential review.

4. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow fifteen (15) business

days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.

G. Identification of Electronic Submittals: Name each electronic Adobe Acrobat PDF file with the following format (Project number / submittal number), (i.e., CSG673 Submittal 213250-01). Inside the electronic submittal, provide the following information within the Adobe Acrobat PDF file:

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information on label for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name and address of Architect.
    d. Name and address of Contractor.
    e. Name and address of subcontractor.
    f. Name and address of supplier.
    g. Name of manufacturer.
    h. Submittal number or other unique identifier, including revision identifier.

4. Submittal number shall use Specification Section number followed by a dash and then a sequential number (e.g., 061000-01). Resubmittals shall include an alphabetic suffix after sequential number (e.g., 061000-01.A).

    a. Number and title of appropriate Specification Section.
    b. Other necessary identification.

H. Deviations: Highlight or otherwise specifically identify deviations from the Contract Documents on submittals.

I. Transmittal: File and transmit each electronic Abobe Acrobat PDF submittal individually in separate, individual emails. Architect will return submittals, without review, received from sources other than Contractor.

1. Transmittal Information Page: On a separate, attached sheet with the Contractor’s letterhead, include the following relevant information:

    a. Project name.
    b. Date.
    c. Names of subcontractor, manufacturer, and supplier.
    d. Minor variations and limitations.
    e. Submittal and transmittal distribution record.
    f. Remarks.

J. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.

2. Note date and content of revision in label or title block and clearly indicate extent of revision.

3. Resubmit submittals until they are marked “Reviewed” or “Reviewed as Noted” approval notation from Architect’s action stamp.

K. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

L. Use for Construction: Use only final submittals with mark indicating "Reviewed” or “Reviewed as Noted” by Architect.

1.5 CONTRACTOR'S USE OF ARCHITECT'S CAD FILES

A. General: At Contractor's written request, copies of Architect's AutoCAD background floor plan drawing files may be made available to Contractor for Contractor's use in connection with Project, subject to the following conditions:

1. The AutoCAD files will be provided as a courtesy to the Contractor and the Architect and the Architect’s consultants do not guarantee the accuracy of the AutoCAD files.

2. The AutoCAD files are to be used solely as background drawings for the preparation of Submittals and Record Documents.
3. The Contractor pays any and all fees assessed by the Architect and/or the Architect’s Consultants for providing any AutoCAD files which contain more than background floor plan drawing.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark the submittal to show which products and options are applicable.
3. Include the following information, as applicable:

a. Manufacturer's written recommendations.
b. Manufacturer's product specifications.
c. Manufacturer's installation instructions.
d. Standard color charts.
e. Manufacturer's catalog cuts.
f. Wiring diagrams showing factory-installed wiring.
g. Standard product operation and maintenance manuals.
h. Compliance with specified referenced standards.
i. Application of testing agency labels and seals.
j. Notation of coordination requirements.

4. Submit Product Data before or concurrent with Samples.
5. Number of Copies: Submit one (1) electronic Adobe Acrobat PDF format copy, unless otherwise indicated. Architect will return one (1) electronic Adobe Acrobat PDF copy. Mark up and retain one (1) electronic copy as a Project Record Document.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data**,** unless submittal of Architect's AutoCAD Drawings are otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

    a. Dimensions.
    b. Identification of products.
    c. Fabrication and installation drawings.
    d. Roughing-in and setting diagrams.
    e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
    f. Shopwork manufacturing instructions.
    g. Templates and patterns.
    h. Schedules.
    i. Design calculations.
    j. Compliance with specified standards.
    k. Notation of coordination requirements.
    l. Notation of dimensions established by field measurement.
    m. Seal and signature of professional engineer if specified.
    n. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

2. Electronic Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
3. Number of Copies: Submit one (1) electronic copy of each submittal. Architect will return one electronic copy.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

    a. Product name and name of manufacturer.

    b. Sample source.
    c. Number and title of appropriate Specification Section.

3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

a. Number of Samples: Submit three (3) full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

   a. Number of Samples: Submit three (3) sets of Samples. Architect will retain one (1) Sample sets; remainder will be returned**.**
      1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
      2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three (3) sets of paired units that show approximate limits of variations.

E. Contractor’s Construction Schedule: Comply with requirements specified in Division 01.

F. Application for Payment: Comply with requirements specified in Division 01 Section "Payment Procedures."

G. Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.

1. Number of Copies: Submit one (1) electronic Adobe Acrobat PDF format copy of each submittal, unless otherwise indicated. Architect will not return copies.
2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
3. Test and Inspection Reports: Comply with requirements specified in Division 01 Section "Quality Requirements."

B. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

C. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

D. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

E. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

F. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

G. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

H. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

I. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

J. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

K. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

L. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."

M. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

N. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:

1. Preparation of substrates.
2. Required substrate tolerances.
3. Sequence of installation or erection.
4. Required installation tolerances.
5. Required adjustments.

6. Recommendations for cleaning and protection.

O. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

P. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S/ ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will marl stamp appropriately to indicate action taken, as follows:

1. Approved (or Reviewed).
2. Approved as Noted (or Reviewed as Noted)
3. Revise and Resubmit
4. Rejected

C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Partial submittals are not acceptable, will be considered non-responsive, and will be returned without review.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

3.3 ELECTRONIC RECORD DOCUMENTS

A. For record documents of the submittals, prepare a series of CD discs or flash drives with copies of all electronic submittals organized as follows:

1. Create an electronic folder or directory name for each specification section.

2. Place copies of all submittals in their appropriate folder or directory.

END OF SECTION 013300

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.

B. Related Sections include the following:

1. Division 01 Section "Allowances" for products selected under an allowance.
2. Division 01 Section "Closeout Procedures" for submitting warranties for Contract closeout.
3. Divisions 02 through 49 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.3 DEFINITIONS

A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical

properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

1.4 SUBMITTALS

A. Substitution Requests: Submit one (1) copy in an electronic Adobe Acrobat PDF format of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

    a. Statement indicating why specified material or product cannot be provided.
    b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
    c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
    d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
    e. Samples, where applicable or requested.
    f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
    g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
    h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
    i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
    j. Cost information, including a proposal of change, if any, in the Contract Sum.
    k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
    l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within five (5) business days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within ten (10) business days of receipt of request, or five (5) business days of receipt of additional information or documentation, whichever is later.

    a. Form of Acceptance: Change Order.
    b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.

B. Comparable Product Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within ten (10) business days of receipt of request, or five (5) business days of receipt of additional information or documentation, whichever is later.

a. Form of Approval: As specified in Division 01 Section "Submittal Procedures."
b. Use product specified if Architect cannot make a decision on use of a comparable product request within time allocated.

C. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.

3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Store cementitious products and materials on elevated platforms.
5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer’s written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.
8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Refer to Divisions 02 through 49 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Where products are accompanied by the term "as selected," Architect will make selection.
4. Where products are accompanied by the term "match sample," sample to be matched is Architect's.

5. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
6. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in Part 2 "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
3. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
5. Available Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
6. Available Manufacturers: Where Specifications include a list of manufacturers, provide a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
7. Product Options: Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.
8. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.
9. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
10. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.

    a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
    b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 PRODUCT SUBSTITUTIONS

A. Timing: Architect will consider requests for substitution if received within thirty (30) days after the Notice of Award and/or prior to the commencement of the Work. Requests received after that time may be considered or rejected at discretion of Architect.

B. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
2. Requested substitution does not require extensive revisions to the Contract Documents.
3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
4. Substitution request is fully documented and properly submitted.
5. Requested substitution will not adversely affect Contractor's Construction Schedule.
6. Requested substitution has received necessary approvals of authorities having jurisdiction.
7. Requested substitution is compatible with other portions of the Work.
8. Requested substitution has been coordinated with other portions of the Work.
9. Requested substitution provides specified warranty.
10. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

2.3 COMPARABLE PRODUCTS

A. Conditions: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION

PART 1 - Revise this Section by deleting and inserting text to meet Project-specific requirements.

PART 2 - This Section uses the term "Architect." Change this term to match that used to identify the design professional as defined in the General and Supplementary Conditions.

PART 3 - Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

PART 4 - GENERAL

4.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

4.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Installation of the Work.
2. Cutting and patching.
3. Progress cleaning.
4. Protection of installed construction.
5. Correction of the Work.

B. Related Requirements:

1. Retain subparagraphs below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.

2. Section 011000 "Summary" for limits on use of Project site.
3. Section 013300 "Submittal Procedures" for submitting surveys.
4. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

4.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

4.4 QUALITY ASSURANCE

1. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

    a. Primary operational systems and equipment.
    b. Fire separation assemblies (Assume all full height partitions are rated).
    c. Air or smoke barriers (Assume all full height barriers are either smoke or fire barriers).
    d. Fire-suppression systems.
    e. Mechanical systems piping and ducts not scheduled for modification or replacement.
    f. Control systems not scheduled for modification or replacement.
    g. Communication systems (Unless system or device removal and/or replacement work is to be performed).
    h. Fire-detection and -alarm systems (Unless system or device removal and/or replacement work is to be performed).
    i. Electrical wiring systems not scheduled for modification or replacement.
    j. Operating systems of special construction.

    k. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Water, moisture, or vapor barriers.
    l. Membranes and flashings.
    m. Exterior window assemblies..
    n. Sprayed fire-resistive material.
    o. Equipment supports.
    p. Piping, ductwork, vessels, and equipment.
    q. Noise- and vibration-control elements and systems.

2. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

B. Cutting and Patching Conference: Before proceeding, meet at the Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 5 - PRODUCTS

5.1 MATERIALS

A. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 6 - EXECUTION

6.1 EXAMINATION

A. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine existing mechanical electrical, and plumbing systems to verify actual configurations and locations of connections for temporary removed and reinstalled or removed and replaced equipment.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

B. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

6.2 PREPARATION

A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination.", including a detailed description of problem encountered, together with recommendation for modifying the Contract Documents.

6.3 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

6.4 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut. Provide temporary support of all existing to remain building systems or components as required to perform the work.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 "Summary."

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
3. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

6.5 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials for more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

    a. Use containers intended for holding waste materials of type to be stored.

4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

H. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

I. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

6.6 STARTING AND ADJUSTING

A. Coordinate startup and adjusting of existing to remain and new equipment and operating components with requirements.

B. Restart existing equipment and operating components temporarily disconnected, removed and reinstalled or affected by the work to confirm proper operation. Repair malfunctioning units, repair or replace existing units damaged during construction operations with new units, and retest.

C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

D. Test each piece of equipment to verify proper operation.

6.7 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

B. Related Requirements:
1. Section 017300 "Execution" for progress cleaning of Project site.
2. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
3. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.3 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.5 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of ten (10) days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
2. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of ten (10) days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Complete final cleaning requirements, including touchup painting.
2. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of ten (10) days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.6 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of ten (10) days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by

Contractor that are outside the limits of construction. Provide list in format approved in advance by the Architect.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Contractor.
    e. Page Numbers

4. Submit list of incomplete items in the following format:

    a. MS Excel electronic file. Architect will return annotated file.
    b. Provide unique identification number for each item.

1.8 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

C. Provide the following cleaning operations before requesting inspection certification of Substantial Completion for entire Project or for a portion of Project:

1. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
2. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
3. Remove tools, construction equipment, machinery, and surplus material from Project site.
4. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
5. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
6. Remove labels that are not permanent.
7. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
8. Replace parts subject to unusual operating conditions.
9. Leave project clean and ready for occupancy.

3.2 REPAIR OF THE WORK

A. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired.

C. Restore damaged construction and permanent facilities used during construction to specified condition.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Product maintenance manuals.
2. Operation manuals for systems, subsystems, and equipment.
3. Systems and equipment maintenance manuals.

B. Related Requirements:

1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect and Owner will comment on whether content of operations and maintenance submittals are acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Initial Manual Submittal: Submit one (1) electronic PDF format version of each manual. Architect and Owner will comment on whether general scope and content of manual are acceptable.

1. Correct or revise each manual to comply with Architect’s and Owner’s comments.

C. Final Manual Submittal: Submit one (1) electronic PDF format version on CD-R or flash drive organized in the same Section format as Manual.

PART 2 - PRODUCTS

2.1 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:

1. Product name and model or product number.
2. Manufacturer’s name.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Schedule for routine and maintenance.
2. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.2 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturer’s maintenance documentation, maintenance procedures, maintenance and service schedules, space parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Manufacturer’s Maintenance Documentation: Manufacturers’ maintenance documentation including the following information for each component part or piece of equipment.

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

C. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly, component removal, repair, and replacement, and reassembly instructions.
5. Demonstration and training video recording, if available.

D. Maintenance and Service Schedules: Include service requirements and preventive and routine maintenance and service schedules.

1. Space Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross referenced to manufacturer's maintenance documentation and local sources of maintenance materials and related services.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

C. Manufacturer's Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

D. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared record Drawings in Section 017839 "Project Record Documents."

E. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.
4. Miscellaneous record submittals.

B. Related Requirements:

1. Section 017300 "Execution" for final property survey.
2. Section 017700 "Closeout Procedures" for general closeout procedures.
3. Section 017823 “Operation and Maintenance Data” for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit copies of record Drawings as follows:

a. Initial Submittal:

1) Submit one (1) PDF electronic file format of scanned record prints of marked-up Record Prints for Architect and Owner review.

b. Final Submittal:

Submit one (1) set of Record Drawings in PDF electronic file format of scanned record prints. Provide each Drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit one (1) set of PDF electronic format files on CD-R or flash drive and one (1) set of paper prints of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one (1) set of PDF electronic format files on CD-R or flash drive of each submittal.

1. Where record Product Data is required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one (1) set of PDF electronic format files of each submittal.

1.4 RECORD DRAWINGS

A. Record Prints: Maintain one set of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

    a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    b. Accurately record information in an acceptable drawing technique.
    c. Record data as soon as possible after obtaining it.
    d. Record and check the markup before enclosing concealed installations.

2. Content: Types of items requiring marking include, but are not limited to, the following:

    a. Dimensional changes to Drawings.
    b. Revisions to details shown on Drawings.
    c. Changes made by Change Order or Construction Change Directive.
    d. Changes made following Architect's written orders.
    e. Details not on the original Contract Drawings.
    f. Field records for variable and concealed conditions.
    g. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:

1. Format: Annotated PDF format electronic file with comment function enabled.2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
3. Refer instances of uncertainty to Architect for resolution.
4. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.

a. Architect makes no representations as to the accuracy or completeness of CAD Drawings as they relate to the Contract Documents.
b. See Section 013300 "Submittal Procedures" for requirements related to use of Architect's digital data files.
c. Architect will provide data file layer information. Record markups in separate layers.

B. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
2. Identification: As follows:

a. Project name.
b. Date.
c. Designation "PROJECT RECORD DRAWINGS."
d. Name of Architect.
e. Name of Contractor.

1.5 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related Change Orders, record Product Data, and record Drawings where applicable.

B. Format: Submit record Specifications as annotated in PDF format electronic file.

1.6 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, record Specifications, and record Drawings where applicable.

B. Format: Submit record Product Data as annotated PDF format electronic file , Provide scanned PDF format electronic file(s) of marked-up of Product Data.

1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

1.7 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as PDF electronic file scanned PDF electronic file(s) of marked-up miscellaneous record submittals.

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 2 - EXECUTION

2.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 017839

SECTION 020700 – SELECTIVE DEMOLITION

PART 1 - GENERAL:

1.1 DESCRIPTION

A. Work Included: Provide labor, material equipment and services required to complete selective demolition work shown or specified, including but not necessarily limited to:

1. Careful demolition and removal from the building of those items identified to be demolished.
2. Salvage, store, and maintain materials for reuse, reinstallation, or delivery to Owner as directed.
3. Patch all existing materials exposed to view affected by selective demolition activities.
4. Complete protection of all existing flooring, finishes, and building components in all areas where construction activities and construction traffic are performed.

1.2 COORDINATION

A. Portions of the work to be performed by Contractor on behalf of the Owner prior to the Contractor's selective demolition activities.
1. Removal/relocation of existing District furniture, equipment and materials.

1.3 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are thoroughly familiar with specified requirements and methods needed for proper installation of work of this section.

1.4 SCOPE OF WORK

A. Provide all selective demolition noted on the Demolition Plans.

B. Provide all selective demolition indicated and required for the performance of all new construction scope of work.

PART 2 – PRODUCTS

2.1 (No products are required in this Section)

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this section will be performed. Correct conditions detrimental to timely and proper completion of work. Do not proceed until unsatisfactory conditions are corrected.

3.2 DEMOLITION

A. By careful study of the Contract Documents, determine the location and extent of selective demolition to be performed.

B. Visit the site and verify the extent and location of selective demolition required, including areas located in the ceiling cavity areas above the existing acoustical tile ceilings.

C. Carefully identify limits of selective demolition.

D. Mark interface surfaces as required to enable workmen also to identify items to be removed and items to be left in place intact. Take special precautions to mark and protect existing telephone, data cabling, control wiring, building system communication wiring and fiber runs located in the existing ceiling cavities.

E. Prepare and follow an organized plan for demolition and removal of items.

1. Shut off, cap, plug, disconnect and render safe existing mechanical, plumbing and electrical systems in areas to be selectively demolished. Prepare for modification or extension under sections governing new work.
2. Install all temporary protection of floor and partition surfaces prior to the commencement of any selective demolition.
3. Completely remove items scheduled to be so demolished and removed, leaving surfaces clean, solid and ready to receive new materials specified elsewhere.
4. In all activities, comply with pertinent regulations of governmental agencies having jurisdiction.

F. Unless identified as material to be relocated or reused, demolished material shall be considered to be the property of the Contractor and shall be completely removed from the job site.

G. Unless instructed otherwise by the Owner or Architect, all material identified to be salvaged for Owner shall be reinstalled in the locations indicated, relocated to an area of the building selected by the Owner, or disposed of offsite if the Owner subsequently elects to not salvage the material.

H. Use means necessary to prevent dust, demolition work, and debris from becoming a nuisance or hazard to the public, to neighbors, to other work being performed on or near the site, and the remainder of the school. Do not allow demolition operations to interfere with School operation and programs, unless Owner has granted such approvals in advance of demolition work. Protect all construction to remain from damage.

3.3 MAINTENANCE OF SITE OPERATIONS

A. This site is active and will continue in operation for the duration of the Project. The contractor shall place and maintain protective barriers and signage as necessary to protect the public and to allow reasonable access to the facility and building areas in continuous operation at all times.

B. The Contractor shall maintain all temporary roadways, parking areas, and walkways in a safe and passable condition at all times.

C. The Contractor shall coordinate with all other Contractors and the District Maintenance

Department personnel working in the area to insure their unimpeded access to the School, especially the loading area is available at all times. This includes both peak and off-peak hours.

D. The Contractor must coordinate with the School regarding all access to existing on-site driveways and roadways, minimizing shut-down periods and generally confirming restricted access periods non-peak hours, outside of normal school hours.

E. Operations at all loading areas and maintenance areas will remain in operation. The contractor must provide at least one adequate lane at all times, including adequate turning space, for truck movement. Very short-term closure will be permitted with advance permission.

3.4 MATERIAL FOR REUSE

A. Carefully disassemble or remove intact, those items designated for reuse.

B. Store, protect, maintain in good condition, and deliver to appropriate installing party when required.

3.5 REPLACEMENTS

A. In the event of demolition of items not so scheduled to be demolished, promptly replace such items to the approval of the Engineer and at no additional cost to the Owner.

END OF SECTION 020700

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Concrete-slab-on-grade (Interior)
    a. Interior (Slab): 5-inch depth, with 6x6/W2.9 x W2.9 WWR reinforcement, doweled.
        1) Provide doweled connection (1/2” @ 24” O.C.) at all junctures with existing floor slab.
2. Concrete Slab-on-grade (Exterior)

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Curing compounds.
4. Floor and slab treatments.

E. Field quality-control test and inspection reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.

E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specification for Structural Concrete,"
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

F. Concrete Testing Service: Owner may elect to engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

B. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.

2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 515M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete.

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Blended Hydraulic Cement: ASTM C 595, Type II. Portland-limestone cement. May supplement with the following:

a. Fly Ash: ASTM C 618, Class C or F.
b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 1 inch (25 mm) nominal for slabs on grade.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M and potable.

2.5 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those

permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.6 CURING MATERIALS

A. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

B. Water: Potable.

2.7 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

B. Bonding Agent: ASTM C 1059, Type II, non-re-dispersible, acrylic emulsion or styrene butadiene.

C. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types I and II, non-load bearing and IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

D. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.

2.8 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 15 percent.
2. Ground Granulated Blast-Furnace Slag: 20 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

2.9 CONCRETE MIXTURES

A. Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3000 psi at 28 days.
2. Minimum Cementitious Materials Content: 624 lb/cu. yd.
3. Slump Limit: 4 inches.
4. Air Content (Interior): Do not allow air content of trowel-finished interior floors to exceed 3 percent.
5. Air Content (Exterior): Air content for exposed exterior slabs of 4 to 6 percent.

2.10 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.11 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:

1. Class A, 1/8 inch (3.2 mm) for smooth-formed finished surfaces.
2. Class B, 1/4 inch (6 mm) for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 REMOVING FORMS

A. General: Formwork for sides of walls and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.5 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.

2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Division 7 Section "Joint Sealants," are indicated.
2. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.

4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleed water appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.7 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

1. Apply scratch finish to surfaces indicated and to receive concrete floor toppings and to receive mortar setting beds for bonded cementitious floor finishes.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces to receive trowel finish.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, paint, or another thin-film-finish coating system.

2. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-foot- (3.05-m-) long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 1/8 inch (3.2 mm).

3.8 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.

3.9 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.

1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
2. Do not apply to concrete that is less than 14 days' old.
3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.10 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.

C. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

D. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

E. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.11 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner may elect to engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:

1. Verification of use of required design mixture.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture.

2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Compression Test Specimens: ASTM C 31/C 31M.

    a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
    b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.

5. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.

a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

6. Additional Tests: Testing and inspecting agency may elect to make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
7. Correct deficiencies in the Work that test reports and inspections indicate dos not comply with the Contract Documents.

END OF SECTION 03300

SECTION 042200 - CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Mortar and grout.

1.3 SCOPE OF WORK

A. Restoration, modification, and replacement of existing CMU affected by selective demolition.

B. Provide new CMU is nominal width indicated and/or to match existing.

1. Partition Type C6 and C6F(6” x 16”) units, horizontal joint reinforcement 16” o.c. vertical. Reinforcement and bracing in accordance with General Notes “Masonry”.
   a. Overall partition heights in accordance with Drawings.

2. Partition Type C8F (8” x 16”) units, horizontal joint reinforcement 16” o.c. vertical. Reinforcement and bracing in accordance with General Notes “Masonry”.
   a. Overall partition heights in accordance with Drawings.

C. Where existing CMU partition removal is indicated, provide extent of selective demolition necessary to provide only full size or half (cut) CMU to maintain existing partition vertical score and joint alignment.

D. Grout all CMU cells solid at all locations where plumbing fixtures and toilet accessories are mounted to new CMU partitions.

1.4 PERFORMANCE REQUIREMENTS

A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.

1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Material Certificates: For each type and size of the following:

1. Masonry units.
    a. Include material test reports substantiating compliance with requirements.
    b. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
2. Cementitious materials. Include brand, type, and name of manufacturer.
3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
4. Grout mixes. Include description of type and proportions of ingredients.
5. Joint reinforcement.

C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

E. Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.

B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

D. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

E. Pre-Installation Conference: Conduct conference at Project site to review and confirm new masonry dimensions, configuration, and product selection.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, discoloration, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide bullnose units for all partition outside corners and end locations.
2. Provide bullnose units for all door frame jambs locations.

B. CMUs: ASTM C 90.

1. Exposed Faces: Provide color and texture matching existing as selected by Contractor for Architect review and approval.

2.3 MORTAR AND GROUT MATERIALS

A. Appearance: Provide new mortar for existing and new ground face unit partition which matches color, aggregate consistency to match existing.

B. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

C. Hydrated Lime: ASTM C 207, Type S.

D. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

E. Mortar Cement: ASTM C 1329.

F. Aggregate for Mortar: ASTM C 144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.

G. Aggregate for Grout: ASTM C 404.

H. Water: Potable.

2.4 REINFORCEMENT

A. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

2.5 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime masonry cement or mortar unless otherwise indicated.
3. For exterior masonry, use portland cement-lime masonry cement or mortar.
4. For reinforced masonry, use portland cement-lime masonry cement mortar cement mortar.
5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.

1. For reinforced masonry, use Type N..
2. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
3. For interior non-load-bearing partitions, Type O may be used instead of Type N.

D. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
2. Proportion grout in accordance with ASTM C 476, paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi.
3. Provide grout with a slump of 8 to 11 inches**]** as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. New interior CMU partition infill to be Stack Bond to match existing.

B. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.

5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond pattern indicated on Drawings; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than [2 inches] [4-inches]. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

H. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.

1. Wedge non-load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
2. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078446 "Fire-Resistive Joint Systems."

3.5 MORTAR BEDDING AND JOINTING

A. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

B. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.6 MASONRY JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete where masonry abuts or faces structural steel or concrete to comply with the following:

1. Provide an open space not less than 1/2 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.8 CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry using one of the following methods:

1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.

2. Install preformed control-joint gaskets designed to fit standard sash block.
3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.
4. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.
5. Submit complete detailing and product material selections to Architect for review and approval.

3.9 LINTELS

A. Provide steel lintels where shown and at all openings.

B. Remove existing steel lintel where existing opening in CMU partition is indicated to be infilled.

C. Remove and replace existing steel lintel where existing opening in CMU partition is to be modified.

D. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.10 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.11 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1. Crush masonry waste to less than 4 inches in each dimension.
2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste.
3. Do not dispose of masonry waste as fill within 18 inches of finished grade.

C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042200

SECTION 048100 - MASONRY REPAIRS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes**:**

1. Split-Face Unit Repair and Replacement.
2. Masonry joint repointing.
3. Masonry Cleaning.
4. Masonry Sealant.

1.2 REFERENCES

A. ASTM C 144-93 -- Standard Specification for Aggregate for Masonry Mortar; 1993.

B. ASTM C 150-96 -- Standard Specification for Portland Cement; 1996.

C. ASTM C 207-91(92) -- Standard Specification for Hydrated Lime for Masonry Purposes; 1991 (Reapproved 1992).

D. ASTM C 216-94 -- Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale); 1994.

E. ASTM C 404-93 -- Standard Specification for Aggregates for Masonry Grout; 1993.

F. ASTM C 476-91 -- Standard Specification for Grout for Masonry; 1991.

G. Cleaning Brick Masonry; Technical Notes on Brick Construction, No. 20 Revised II; Brick Institute of America (BIA); 1990.

1.3 SUBMITTALS

A. Product Data: Submit published data from manufacturers of products and accessories specified, indicating compliance with requirements.

1.4 SCOPE OF WORK (DEER PATH SCHOOL)

A. Building Courtyard: Provide re-pointing, cleaning, and sealing of all split-face masonry units. (Refer to Contract Drawings for Scope of Work quantities.)

B. Courtyard: Provide cleaning of existing tiered concrete seating area surfaces.

C. Building Perimeter: Provide select re-pointing, cleaning, and sealing of all split-face masonry units. (Refer to Contract Drawings for Scope of Work quantities.)

1. Re-pointing, cleaning, and sealing of existing Face Brick is NOT included.

D. Playgound Enclosure Wall: Provide re-pointing, cleaning, and sealing of all split-face masonry units. (Refer to Contract Drawings for Scope of Work quantities.)

1.5 QUALITY ASSURANCE

A. Source Control for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

1. Match color and composition of existing mortar(s).

B. Mock-up (Joint Repointing): Prior to commencement of joint repointing, prepare a sample 24" x 24" area of the existing to remain split-face masonry to illustrate color and profile of new mortar installation.

1. Schedule Owner review after mock-up area mortar is fully dried.
2. Replace / rework mock-up area as required / requested by Owner.
3. Approved mock-up may be part of the completed work.

C. Mock-up (Masonry Cleaning): Prior to commencement of masonry cleaning, prepare a sample area of the existing to remain split-face masonry to illustrate actual cleaned masonry appearance..

1. Schedule Owner review after mock-up area is fully dried.
2. Approved mock-up may be part of the completed work.

D. Mock-up (Masonry Sealing): Prior to commencement of masonry sealant application, prepare a sample area of the existing to remain split-face masonry to illustrate the final appearance of the sealant application.

1. Schedule Owner review after sealant mock-up area is fully dried..
2. Approved mock-up may be part of the completed work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means which will prevent mechanical damage and deterioration due to moisture, temperature changes, and contamination by other materials.

B. Protect cementitious materials from precipitation and absorption of ground moisture.

C. Store masonry accessories to prevent corrosion, dirt accumulation, and other deterioration.

1.7 PROJECT CONDITIONS

A. Hot-Weather Protection: Cover or shade masonry units and mortar materials and use cool water for mortar whenever ambient air temperature is 90 degrees F or greater. At air temperatures of 85 degrees F or above, if relative humidity is less than 30 percent or wind is in excess of 15 miles per hour, provide protection by immediately covering newly constructed walls, by providing windbreaks, or by using fog spray to reduce rate of evaporation.

PART 2 - PRODUCTS

2.1 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I.

1. Type III may be substituted during cold-weather construction. Provide natural color or white cement, confirm with Architect.

B. Hydrated Lime: ASTM C 207, Type S.

C. Aggregate for Mortar: ASTM C 144.

D. Grout Aggregate: ASTM C 404.

E. Water: Potable.

2.2 MASONRY CLEANER

A. Cleaning Product and Method: Provide specified and/or contractor recommended cleaning product submittal and cleaning method for review an approval.

2.3 MASONRY SEALANT

A. Cleaning Product and Method: Provide specified and/or contractor recommended sealant product submittal and sealant product application for review an approval.

2.4 MORTAR AND GROUT MIXES

A. General: Do not use admixtures unless indicated as acceptable in the contract documents.

1. Do not use calcium chloride in mortar or grout mixture.

B. Mixing: Use mechanical batch mixer and comply with referenced ASTM standards.

C. Mortar for Unit Masonry: ASTM C 270, Proportion Specification.

1. Limit cementitious materials to lime and portland cement.
2. Reinforced masonry: Type S.
3. Applications as follows: Type N.
   a. Exterior, above-grade walls.
   b. Locations for which another mortar type has not been specifically indicated.

D. Grout: ASTM C 476; provide consistency required at time of placement to fill completely all spaces indicated to be grouted.

PART 3 - EXECUTION

3.1 MASONRY REPLACEMENT PROCEDURES

A. Owner, Architect, and Contractor to perform a site review of the existing split-face masonry to identify any units requiring replacement.

B. Existing split-face masonry unit replacement will be performed on a Time and Material Fee basis as an Additional Service.

C. Remove damaged face masonry units in a manner that will minimize dust and debris generation, and to prevent damage to existing joint reinforcement, flashing, adjacent masonry units, and adjacent building materials and components.

D. Remove all excess mortar adhered to existing concrete masonry unit faces.

E. All joints surrounding replacement units to be pointed with fresh mortar, filling each joint completely and tooling to match color, texture and profile of adjacent mortar work.

F. Install new split-face unit(s) which duplicates color, coursing, pattern bond, and texture of adjoining existing masonry.

3.2 JOINT REPOINTING PROCEDURES

A. Remove old mortar the full width of the joint to a depth of 3/8" to 1/2" to form a rectangular shaped void, or until sound mortar is encountered. Do not remove mortar in excess of one third (1/3) of the depth of the masonry unit above. Remove all unsound or deteriorated mortar.

1. Provide Owner the opportunity to inspect joint voids prior to application of new mortar.

B. Remove all loose particles from the joint by brushing, rinsing with water or blowing with air.

C. Pre-hydrate Type N mortar to be used in pointing in accordance with ASTM C270, to minimize shrinkage.

D. Pre-moisten the joints to be pointed and the adjacent masonry units by allowing water to be applied and absorbed before placing mortar into the joints.

E. Force the mortar into the joints in one consistent direction in layers (lifts) not to exceed 1/4", with subsequent lifts being applied when the previous lift is stiffened to an appropriate hardness.

F. Tool joints to match existing adjacent joints and / or approved mock-up.

G. Remove excess mortar by brushing or wiping the work after the mortar has set and will not smear.

H. Provide raked joints in locations indicated. Raked joints to receive application of sealant bead.

3.3 CLEANING AND PROTECTION

A. Products

1. Prosoco, Environ Lean ReVive.
2. Other manufacturer product, approved by Owner/Architect.

B. Execution

1. Clean masonry prior to the installation of new backer rod and sealant.
2. Scrape or brush off adhered and loose mortar particles and heavy growths of contaminates by hand, using non-metallic tools.
3. Power wash dry surfaces with heavy contamination prior to cleaning with product.
4. Test small area of masonry surface to confirm suitability, coverage rate and desired results before beginning overall application. Let surface dry thoroughly before inspection.
5. Provide additional pre-test and post-test power washing where necessary.

a. Review test cleaning results with Owner/Architect.

7. Before applying cleaning solution, saturate masonry surfaces with water; rinse thoroughly immediately after cleaning. (Where recommended by manufacturer.)
8. Apply cleaning product with soft-bristle brush and/or coarse spray.
9. Thoroughly rinse with enough water and water pressure to flush spent cleaner and dissolved soiling from the masonry surface and surface pores without damage.

C. Protection: Institute protective measures as required to ensure that unit masonry work will be clean and undamaged at substantial completion.

3.4 SEALANT (WATER-REPELLENT SEALER)

A. Products

1. BASF, MasterProtect H 185.
2. Other manufacturer product, approved by Owner/Architect.

B. Execution

1. Prepare existing masonry surface in accordance with manufacturer recommendations.
2. Test a small area of the surface before starting general application to ensure compatibility, desired performance results, aesthetics, and coverage rates.
3. Spray application in accordance with manufacturer's recommendations for pressure, coverage, and saturation.
4. Apply second coat with wet-on-wet application.

END OF SECTION 04810

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Concealed wood blocking, cants, and nailers for millwork casework, restroom accessories, and hollow metal and window framing, and miscellaneous new construction scope of work.

1.3 SSCOPE OF WORK

A. Furnish and install all wood nailers and blocking indicated on the Contract Documents, and to the extent necessary for the installation of new products and equipment and reinstallation of existing products and equipment in accordance with the manufacturer's recommendations.

B. Remove and replace any and all existing wood blocking, framing, both exposed and concealed, which is deteriorated and no longer structurally sound and is, in the Contactor and Owner or Architect's opinion, no longer appropriate to remain or be reused.

1.4 DEFINITIONS

A. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

1.5 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.

3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
4. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

C. Roofing Manufacturer Certificates: Provide written certification from roofing manufacturer confirming compatibility of all treated dimensional lumber with specified roofing products and materials.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Douglas Fir, structural grade #2 or better.
3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
4. Provide dressed lumber, S4S, unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA C2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX)].

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.Select only first option in subparagraph below if authorities having jurisdiction require quality mark on all materials.

D. Provide treated lumber for the following applications:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking,and similar concealed members in contact with masonry or concrete.

2.3 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 19 percent maximum moisture content of any species.

C. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:

1. Hem-fir or hem-fir (north), Construction or 2 Common grade; NLGA, WCLIB, or WWPA.
2. Spruce-pine-fir (south) or spruce-pine-fir, Construction or 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.

D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

2.4 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Power-Driven Fasteners: NES NER-272.

C. Wood Screws: ASME B18.6.1.

D. Lag Bolts: ASME B18.2.1.

E. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

F. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

B. Do not splice structural members between supports, unless otherwise indicated.

C. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

D. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.

3.2 WOOD BLOCKING AND NAILER INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

3.3 PROTECTION

A. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes joint sealants for the applications indicated on the Contract Drawings:

B. Provide backer rods and joint sealants as indicated on the Drawings, described in these Specifications, and as required for a complete and proper installation, including, but not limited to, the following:

1. Provide silicone sealant throughout, unless noted otherwise.
2. Provide mildew-resistant sealant throughout, unless noted otherwise.
3. Scope of sealant installation includes, but is not limited to, the following:
    a. Joints between masonry materials.
    b. Masonry control and expansion joints.
    c. Joints between hollow metal frames, masonry partitions, and plaster/gypsum board ceilings.
    d. Joints between plastic laminate counter/backsplash and CMU partitions.
    e. Joints between plastic laminate counter/backsplash and plastic laminate tall cabinet surface.
    f. Corner juncture joints between ceramic tile wall finish surfaces.
    g. Joints between new and existing plumbing fixtures and adjacent partitions, partition finishes, and flooring.
    h. Joints between exterior masonry and steel lintels.
    i. Joints between gypsum board partition/ceiling surfaces and CMU partitions.
    j. Joints between gypsum board partition/ ceiling surfaces and aluminum.
    k. Joints between aluminum framing surfaces and aluminum framing surfaces and masonry.
    l. Other new dissimilar material junctures.

1.3 SUMMARY

A. Provide new backer rod and sealant at all applications identified in the “Summary” section.

B. Provide replacement of existing exterior building expansion joint backer rod and joint sealant.

C. Provide sealant application at juncture of all existing to remain plumbing fixtures (water closet, urinal, and lavatory) and existing CMU partition.

1. All existing sealant to be completely removed prior to application of new sealant.

1.4 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

1.5 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Qualification Data: For Installer.

E. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:

1. Materials forming joints substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

F. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.

G. SWRI Validation Certificate: For each elastomeric sealant specified to be validated by SWRI's Sealant Validation Program.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project. Installer shall must be competent workmen skilled in sealant installation with at least five (5) years of experience on similar projects.

B. Source Limitations: Obtain all types of joint sealant through one source from a single manufacturer.

C. Product Testing: Obtain test results for “Product Test Reports” Paragraph in “Submittals” Article from a qualified testing agency based on testing current sealant formulations within a 36-month period preceding the commencement of the Work.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E-548.

1.7 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.8 WARRANTY

A. Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two (2) years from date of Substantial Completion.

B. Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two (2) years from date of Substantial Completion.

C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:

1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
2. Disintegration of joint substrates from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles or comparable products as recommended by the roofing manufacturer, window manufacturer, metal panel manufacturer, or other product manufacturer.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

C. Single-Component Neutral-Curing Silicone Sealant (ES-1):

1. Products:
   a. Dow Corning Corporation; 790.
   b. Dow Corning Corporation; 791.
   c. Dow Corning Corporation; 795
   d. Other, which is appropriate for the application, as approved by Architect.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 100/50.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint material surface substrates indicated, O.
   a. Use O Joint Substrates: Color anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, ceramic tile, wood.

6. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.

D. Single-Component Mildew-Resistant Neutral-Curing Silicone Sealant (ES-2):

1. Products: Include, but not limited to the following:
   a. Dow 756 SMS
   b. Pecora Corporation; 898.
   c. Tremco; Tremsil 600 White.
   d. Other, which is comparible and appropriate for the application, as approved by Architect.
2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint material substrates indicated, O.
   a. Use O Joint Substrates: Color anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, ceramic tile.

2.4 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.

2.5 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Non-staining, non-aborbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and

approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.
    c. Gypsum Board

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal (Ferrous and Non-Ferrous)
    b. Glass.

B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

D. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.

3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
3. Provide flush joint configuration where indicated per Figure 5B in ASTM C 1193.
4. Provide recessed joint configuration of recess depth and at locations indicated per Figure 5C in ASTM C 1193.

    a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

G. Installation of Preformed Silicone-Sealant System: Comply with the following requirements:

1. Apply masking tape to each side of joint, outside of area to be covered by sealant system.
2. Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion ad substrate.
3. Complete installation of sealant system in horizontal joints before installing in vertical joints. Lap vertical joints over horizontal joints. At ends of joints, cut silicone extrusion with a razor knife.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079200

SECTION 081140 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Furnishing and installing new hollow-metal (HM) steel doors and frames.
2. Furnishing and installing new hollow-metal (HM) steel doors in existing frames.

B. Related Sections include the following:

1. Division 8 Door Hardware Section for door hardware for steel doors.
2. Division 9 Painting Section for field painting steel doors and frames.

1.3 SCOPE OF WORK

A. Furnish and install new interior hollow metal (HM) doors and frames.
1. New replacement interior hollow metal doors to match appearance, dimensions, and configuration and construction of existing stile and rail hollow metal doors. (Three Oaks School).
2. New replacement interior hollow metal doors to match appearance, dimensions, and configuration of existing hollow metal doors (Deer Path School).
3. New interior hollow metal doors in appearance, dimensions and configuration noted on Contract Drawings (Deer Path School).

1.4 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings.

1.5 SUBMITTALS

A. Product Data: Include construction details, material descriptions, core descriptions, label compliance, fire-resistance and temperature-rise ratings, and finishes for each type of custom steel door and frame specified.

B. Shop Drawings: In addition to requirements below, provide a schedule of steel doors and frames using same reference numbers for details and openings as those on Drawings:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details.
3. Frame details for each frame type, including dimensioned profiles.
4. Details and locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, accessories, joints, and connections.

C. Qualification Data: For Installer.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Installer to have at least five (5) years experience installing the type of steel doors and frames specified. Installation contractor shall employ workers trained and approved by the steel door and frame manufacturer.

B. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated, as documented according to ASTM E 548.

C. Source Limitations: Obtain custom steel doors and frames through one source from a single manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver doors and frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic.

1. Provide additional protection to prevent damage to finish of factory-finished doors and frames.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store doors and frames under cover at Project site. Place units in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high, wood blocking. Avoid using non-vented plastic or canvas shelters that could create a humidity chamber.

1. If wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.8 PROJECT CONDITIONS

A. Field Measurements: Verify openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Existing Dimensions: Field measure all existing to remaain hollow metal door frames and/or masonry openings scheduled for replacement door(s) or replacement door(s) and frame.

2. Guaranteed Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating custom steel frames without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.9 COORDINATION

A. Coordinate installation of anchorages for steel frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ceco Door Products; an ASSA ABLOY Group Company.
2. CURRIES Company; an ASSA ABLOY Group Company.
3. Pioneer Industries, Inc.
4. Steelcraft; an Ingersoll-Rand Company.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 zinc (galvanized) or A60 zinc-iron-alloy (galvannealed) coating designation.

D. Supports and Anchors: After fabricating, galvanize units to be built into exterior walls according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Provide items to be built into exterior walls, hot-dip galvanized according to ASTM A 153/A 153M.

F. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching custom steel door frames of type indicated.

G. Grout: Comply with Division 4 Section "Unit Masonry Assemblies."

H. Grout: Comply with ASTM C 476, with a slump of 4 inches for custom steel door frames built into concrete or masonry, as measured according to ASTM C 143/C 143M.

I. Glazing: Comply with requirements in Division 8 Section "Glazing."

J. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type non-corrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STEEL DOORS

A. General: Provide doors of design indicated, not less than 1-3/4 inches thick, of seamless hollow construction, unless otherwise indicated. Construct doors with smooth surfaces without visible joints or seams on exposed faces.

1. Design: Flush panel, glazed and unglazed.
2. Design (Three Oaks School): Stile and Rail, glazed.

B. Interior Door Face Sheets: Fabricated from minimum 0.053-inch-thick (16 gauge), metallic-coated steel sheet or cold-rolled steel sheet.

C. Core Construction: Fabricate doors with core indicated.

1. Laminated Steel-Stiffened Core: 0.026-inch- thick, steel vertical stiffeners extending full-door height, with vertical webs spaced not more than 6 inches apart, fastened to face sheets with waterproof adhesive. Spaces filled between stiffeners with glass- or mineral-fiber insulation.
2. Fire-Rated Door Core: As required to provide fire-protection and temperature-rise ratings indicated.

D. Top and Bottom Channels: Minimum 0.067-inch-thick (14 gauge), steel channel spot welded, not more than 6 inches o.c., to face sheets.

1. Top and bottom edges of doors closed with closing channels of same material and thickness as face sheets; welded so webs of channels are flush with door edges.

E. Hardware Reinforcement: Fabricate reinforcement plates from same material as door face sheets to comply with the following minimum sizes:

1. Hinges: Minimum 0.167 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
2. Lock Face, Flush Bolts, Closers, and Concealed Holders: Minimum 0.093 inch thick.
3. All Other Surface-Mounted Hardware: Minimum 0.067 inch thick.

F. Hardware Enclosures: Where specified, provide enclosures and junction boxes within doors for electrically operated door hardware, interconnected with UL-approved, 1/2-inch- diameter conduit and connectors.

1. For door assemblies specified for installation of wiring, provide access plates to junction boxes, fabricated from same material and thickness as face sheet and fastened with at least 4 security fasteners spaced not more than 6 inches o.c.

2.4 STEEL FRAMES

A. General: Fabricate frames of construction indicated, with faces of corners mitered and contact edges closed tight.

1. Frames for Doors: Welded.
2. Door Frames for Openings 48 Inches Wide or Less: Fabricated from 0.053-inch-thick (16 gauge) steel sheet.
3. Door Frames for Openings More Than 48 Inches Wide: Fabricated from 0.067-inch-thick (14 gauge) steel sheet.

B. Exterior Frames: Formed from metallic-coated steel sheet or from cold-rolled steel sheet.

1. All frames to be galvanized steel.

C. Hardware Reinforcement: Fabricate reinforcement plates from same material as frames to comply with the following minimum sizes:

1. Hinges: Minimum 0.167 inch thick by 1-1/4 inches wide by 10 inches long, secured by not less than 6 spot welds.
2. Strikes, Hold-Open Arms, and Closers: Minimum 0.093 inch thick.
3. Surface-Mounted Hardware: Minimum 0.093 inch thick.

D. Head Reinforcement: Minimum 0.093-inch- thick, steel channel or angle stiffener.

E. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.053 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.156 inch thick.
2. Post installed Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

F. Floor Anchors: Formed from same material as frames, not less than 0.067 inch thick (14 guage), and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

G. Plaster Guards: Formed from same material as frames, not less than 0.016-inch thick.

2.5 FABRICATION

A. General: Fabricate steel doors and frames to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper

assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Steel Doors: Comply with ANSI A250.4, Level A.

1. Visible joints or seams around glazed lite inserts are permitted.
2. Single-Acting Doors: Bevel both vertical edges 1/8 inch in 2 inches .
3. Edges: Door face sheets joined at vertical edges by continuous weld extending full height of door; with edges ground and polished, providing smooth, flush surfaces with no visible seams.
4. Edges: Both vertical door edges joined by visible, continuous interlocking seam (lock seam) full height of door.
5. Glazing Stops: Removable, flush with door surface of interior door face.

C. Steel Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners, unless otherwise indicated.
2. Plaster Guards: Weld guards to frame at back of hardware mortises in frames installed in concrete or masonry.
3. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
4. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        1) Two anchors per jamb up to 60 inches in height.
        2) Three anchors per jamb from 60 to 90 inches in height.
        3) Four anchors per jamb from 90 to 96 inches in height.
        4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof more than 96 inches in height.

    b. Post-Installed Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

5. Head Reinforcement: For frames more than 48 inches wide, provide continuous head reinforcement for full width of opening, welded to back of frame at head.
6. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Provide plastic plugs to keep holes clear during construction.

    a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
    b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

D. Hardware Preparation: Factory prepare steel doors and frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section "Door Hardware."

1. Reinforce doors and frames to receive non-templated mortised and surface-mounted door hardware.

2. Locate door hardware as indicated, or if not indicated, according to HMMA 831, "Recommended Hardware Locations for Custom Hollow Metal Doors and Frames."

2.6 STEEL FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Finish steel door and frames after assembly.

B. Metallic-Coated Steel Surface Preparation: Clean surfaces with non-petroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.

1. Galvanizing Repair Paint: High-zinc-dust-content paint for re-galvanizing welds in steel, complying with SSPC-Paint 20.

C. Steel Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning"; remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel; comply with SSPC-SP 3, "Power Tool Cleaning," or SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

D. Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than 0.7 mils .

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied finish paint system indicated; and providing a sound foundation for field-applied topcoats despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of custom steel doors and frames.

1. Examine roughing-in for embedded and built-in anchors to verify actual locations of steel frame connections before frame installation.
2. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory.

B. Prior to installation and with installation spreaders in place, adjust and securely brace custom steel door frames for squareness, alignment, twist, and plumb to the following tolerances:

1. Squareness: Plus or minus 1/16 inch , measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
2. Alignment: Plus or minus 1/16 inch , measured at jambs on a horizontal line parallel to plane of wall.
3. Twist: Plus or minus 1/16 inch , measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
4. Plumbness: Plus or minus 1/16 inch , measured at jambs on a perpendicular line from head to floor.

C. Drill and tap doors and frames to receive non-templated mortised and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Provide doors of sizes, thicknesses, and designs indicated. Install steel doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Steel Frames: Install steel frames for doors, sidelights, transoms, borrowed lights and other openings, of size and profile indicated.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. At fire-protection-rated openings, install frames according to NFPA 80.
    b. Where frames are fabricated in sections due to shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    c. Install frames with removable glazing stops located on secure side of opening.
    d. Install door silencers in frames before grouting.
    e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    f. Check plumb, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
    g. Apply bituminous coating to backs of all frames to accommodate filling with mortar, grout, and plaster containing anti-freezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor and secure with post-installed expansion anchors.
3. Masonry Walls: Coordinate installation of frames to allow for partial solidly filling space between frames and masonry with mortar to a height of 36" above finished floor.
4. In-Place Concrete or Masonry Construction: Secure frames in place with post-installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.

5. Installation Tolerances: Adjust custom steel door frames for squareness, alignment, twist, and plumb to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch , measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch , measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch , measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch , measured at jambs at floor.

C. Steel Doors: Fit hollow metal doors accurately in frames, within clearances indicated below. Shim as necessary.

1. Non-Fire-Rated Doors:

    a. Jambs and Head: 1/8 inch plus or minus 1/16 inch .
    b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch .
    c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch .
    d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch .

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

D. Security Raceway (Exterior Doors): Provide conduit and pull string between head of door (adjacent contactor prep hole) and ceiling cavity for installation of wiring service for door security contactor connection.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work including steel doors or frames that are warped, bowed, or otherwise unacceptable.

B. Clean grout and other bonding material off steel doors and frames immediately after installation.

C. Prime-Coat Touch-up: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.

D. Galvannealed Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 081140

SECTION 082550 - FRP DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Furnish and install FRP doors and frames for select exterior door replacement locations.

B. Related Sections include the following:

1. Division 8 Door Hardware Section for door hardware.
2. Division 8 Glazing Section for new doors and frame glazing.

1.3 SCOPE OF WORK

A. Remove existing hollow metal door, frame and hardware.

B. Provide new FRP exterior door and frame assemblies for select exterior doors and frames indicated for replacement.

C. All new exterior door frames installed in a masonry partition are to be grouted solid to a height of 24 inches A.F.F.

D. All new exterior frame voids to be field insulated.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer’s product data, including description of materials, components, fabrication, finishes and installation.

B. Shop Drawings: Submit manufacturer’s shop drawings, including construction details, material descriptions, core descriptions, label compliance, fire-resistance and temperature-rise ratings, and finishes for each type of door and frame specified.

C. Shop Drawings: In addition to requirements below, provide a schedule of doors and frames using same reference numbers for details and openings as those on Drawings:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details.

3. Frame details for each frame type, including dimensioned profiles.
4. Details and locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, accessories, joints, and connections.

D. Samples:

1. Door: Submit manufacturer's sample of door showing face sheets, core, framing, and finish.
2. Color: Submit manufacturer's samples of standard colors of doors and frames.

E. Test Reports: Submit test reports from qualified independent testing agency indicating doors comply with specified performance requirements.

F. Maintenance Manual: Submit manufacturer's maintenance and cleaning instructions for doors.

G. Project References: Submit list of similar successfully completed projects, including project name and location, and type and quantity of doors manufactured.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Installer to have at least five (5) years experience installing the type of doors and frames specified. Installation contractor shall employ workers trained and approved by the door and frame manufacturer.

B. Manufacturer Qualifications: Continuously engaged in manufacturing of doors and frames of similar type to that specified, with a minimum of fifteen (15) years successful experience.

C. Source Limitations: Obtain doors and frames through one source from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying opening door mark and manufacturer.

B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions.

C. Handling: Protect materials and finish from damage during handling and installation.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating frames without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.8 COORDINATION

A. Coordinate installation of anchorages for frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in masonry. Deliver such items to Project site in time for installation.

1.9 WARRANTY

A. Installer Warrantee: Warrant door and frame installation.

1. Warrantee period: Two (2) years from Substantial Completion Date.

B. Product Warrantee: Warrant doors and frames against failure in materials and against failure in materials and workmanship, including excessive deflection, faculty operation, and deterioration of finish or construction in excess of normal weathering.

1. Warrantee period: Ten (10) years from Substantial Completion Date.

C. Corrosion Warrantee: Warrant the doors and frames for failure as a result of corrosion.

1. Warrantee Period: Lifetime from Substantial Completion Date.

D. Finish Warrantee: Warrant the door and frame finish.

1. Warrantee Period: Three (3) years from Substantial Completion Date.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products which meet or exceed the specifications.

B. Basis of Design (Doors): Special-Lite, Inc., AF-200 Series Composite Smooth Doors

C. Basis of Design (Frames): Special-Lite Inc., AF-150 Series Frames

2.2 MATERIALS

A. General: Provide door assemblies that have been designed and fabricated to comply with specified performance requirements, as demonstrated by testing manufacturer’s corresponding standard systems.

B. Air Infiltration: Tested in accordance with ASTM E 283 at pressure differential of 6.24 psf. Door infiltration shall not exceed 0.45 cfm/sq. ft.

C. Water Infiltration: Tested in accordance with ASTM E 331. Door shall not have any water leakage.

D. Uniform Load Structural: Tested in accordance with ASTM E 330. Plus or minus 80 psf.

E. Thermal Transmission: U-Value, tested in accordance with ASTM C 1363. Maximum of 0.18 BTU/hr x sf x degrees F.

F. Surface Burning Characteristics (FRP Doors and Panels): Tested in accordance with ASTM E 84.

1. Flame Spread: Maximum of 25, Class C.
2. Smoke Developed: Maximum of 450, Class C.

G. Grout: Comply with Division 4 Section "Unit Masonry Assemblies."

H. Grout: Comply with ASTM C 476, with a slump of 4 inches for custom steel door frames built into concrete or masonry, as measured according to ASTM C 143/C 143M.

I. Glazing: Comply with requirements in Division 8 Section "Glazing."

J. FRP Face Sheet Properties: Meet or exceed to Basis of Design manufacturer/product properties for the following criteria.

1. Izod Impact Strength, ASTM D 256.
2. Tensile Strength, ASTM D 638.
3. Tensile Modulus, ASTM D 638.
4. Water Absorption, ASTM D 570.
5. Flexural Strength, ASTM D 790.
6. Flexural Modulus, ASTM D 790.
7. Barcol Hardness, ASTM D 2583.
8. Gardner Impact Strength, ASTM D 3029.

2.3 FRP FLUSH DOORS

A. Construction:

1. Door Design: Provide doors in design/configuration indicated on drawings.
2. Door Thickness: 1-3/4 inches.
3. Construction: Fabricated using insulated pultruded stiles and rails with .120-inch FRP face sheets. Stiles and rails to be secured at corners with pultruded corner clip.
4. Reinforcement; Solid high-density urethane shapes to be chemically welded at factory.
5. Top Rail: Pultruded FRP insulated stile material, dimension(s) indicated on drawings.
6. Bottom Rail: Pultruded FRP insulated stile material, dimension(s) indicated on drawings.

B. Face Sheets: Exterior grade UV resistant FRP, 0.120-inch thickness, finish color throughout, sandstone texture.

1. Color: Selected from manufacturer’s full range of standard colors.

C. Core Construction: Polypropylene Honeycomb, 5.0 pcf density.

D. Hardware: Pre-machine doors in accordance with templates from specified hardware manufacturers.

E. Fasteners: Aluminum, 18-8 stainless steel, compatible with door materials and items to be fastened.

F. Cutouts: Manufacture doors with cutouts for required vision lites, louvers, and panels.

2.4 FRP FRAMING SYSTEMS

A. Dimensions: Provide dimensions as indicated on the Drawings.

1. Width: 2-inch face.
2. Depth: 5-3/4-inch, unless noted otherwise on drawings.

B. Materials: 1/4-inch thick solid pultruded FRP profiles, no corrosive components or reinforcement.

C. Assembly: One-piece chemically welded at factory.

1. Corner Construction: Mitered with 4" x 4" x 3/8" pultruded FRP angle reinforcement with interlocking pultruded FRP brackets.
2. Reinforcement: 1/4-inch FRP chemically welded at all hinge, strike and closer locations.
3. Transom and Sidelites: Same material as perimeter frame with removable stop for glass, where indicated.

D. Anchors: Furnished with type as specified on drawings.

E. Fasteners (for reinforcement): 18-8 stainless steel.

2.5 FABRICATION

A. Sizes and Profiles: Required sizes for door and frame units, and profile requirements shall be as indicated n the drawings.

B. Coordination of fabrication: field measure before fabrication and show recorded measurements on shop drawings.

C. Assembly: Complete cutting, fitting, forming, drilling, and chemically welding of FRP before assembly.

2.6 HARDWARE

A. General: Pre-machine doors in accordance with templates from specified hardware manufacturers and hardware schedule. Reinforce for specific hardware locations.

B. Hardware Schedule: Install hardware as specified in Section 087100.

2.7 FINISH (DOORS AND FRAMES)

A. Paint Finish:

1. Product: Two-part aliphatic polyurethane, low VOC, Industrial Coating, manufacturer's standard colors, as selected by Owner.
2. Application: One (1) prime and two (2) finish coats.
3. Thickness: 5 mils.
4. Sheen: Semi-Gloss.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of doors and frames.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install doors in accordance with manufacturer's instructions:

1. Install doors plumb, level, square, true to line, and without warp or rack.
   a. Squareness: Plus or minus 1/16 inch , measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
   b. Alignment: Plus or minus 1/16 inch , measured at jambs on a horizontal line parallel to plane of wall.
   c. Twist: Plus or minus 1/16 inch , measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
   d. Plumbness: Plus or minus 1/16 inch , measured at jambs on a perpendicular line from head to floor.
2. Anchor frames securely in place, plumbed and aligned.
3. Install doors to be weathertight in closed position.
4. Install frames with removable glazing stops located on secure side of opening.
5. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor and secure with post-installed expansion anchors.
6. In-Place Concrete or Masonry Construction: Secure frames in place with post-installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. Installation Tolerances: Adjust door frames for squareness, alignment, twist, and plumbness.

B. Security Raceway (Exterior Doors): Provide conduit or wireway/pathway with pull string between head of door and ceiling cavity for installation of door security contactor wiring connection.

3.3 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work including doors or frames that are warped, bowed, or otherwise unacceptable.

END OF SECTION 081140

SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Three Oaks School (Courtyard): Exterior aluminum storefront framing and aluminum storefront entrances.

a. **Alternate Bid Number One**: All work associated with the Three Oaks School aluminum storefront system installation (and existing hollow metal window framing removal) is Alternate Bid One Scope of Work.

2. Deer Path School: New exterior aluminum storefront entrance framing system to meet manufacturer and product specifications

3. Three Oaks School: New exterior aluminum storefront entrance framing system to match manufacturer and color of existing (new) aluminum storefront entrance installations:

a. Manufacturer / Product: Tubelite Series TI400.
b. Finish Color: Patina Green

B. Related Sections:

1. Door Hardware:
2. Glazing:

1.3 DEFINITIONS

A. ADA/ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disability Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities."

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Aluminum-framed systems shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:

1. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
2. Dimensional tolerances of building frame and other adjacent construction.
3. Failure includes the following:
    a. Deflection exceeding specified limits.
    b. Thermal stresses transferring to building structure.
    c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
    d. Noise or vibration created by wind and by thermal and structural movements.
    e. Loosening or weakening of fasteners, attachments, and other components.
    f. Sealant failure.
    g. Failure of operating units.

B. Structural Loads:

1. Wind Loads:
    a. Basic Wind Speed: 90 mph.
    b. Importance Factor: 1.15.
    c. Exposure Category: B.

C. Deflection of Framing Members:

1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane shall not exceed L/175 of the glass edge length for each individual glazing lite.
2. Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or 1/8 inch, whichever is smaller amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components directly below to less than 1/8 inch and clearance between members and operable units directly below to less than 1/16 inch.

D. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not fewer than 10 seconds.

E. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of .06 cfm/sq. ft.. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft.

F. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.

G. Water Penetration under Dynamic Pressure: Provide aluminum-framed systems that do not evidence water leakage through fixed glazing and framing areas when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.

1. Maximum Water Leakage: According to AAMA 501.1. No uncontrolled water penetrating aluminum-framed systems or water appearing on systems' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters that is drained to exterior and water that cannot damage adjacent materials or finishes.

H. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
2. Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.

a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
b. Low Exterior Ambient-Air Temperature: 0 deg F.

3. Interior Ambient-Air Temperature: 75 deg F.

I. Average Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having average U-Factor of not more than 0.57 Btu/sq. ft. x h x deg F (3.23 W/sq. m x K) when tested according to AAMA 1503.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for aluminum-framed systems.

B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.

1. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.
2. For entrance doors, include hardware schedule prepared by hardware supplier and indicate operating hardware types, functions, quantities, and locations.
3. Samples for Initial Selection: For units with factory applied color finishes.
4. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

C. Other Action Submittals:

1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

D. Delegated-Design Submittal: For aluminum-framed systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of aluminum-framed systems.
2. Include design calculations.

1.6 INFORMATIONAL SUBMITTALS

A. Installer Qualifications: Capable of assuming engineering responsibility and performing the work of this Section and who is acceptable to the manufacturer.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum framed systems, indicating compliance with performance requirements.

C. Warrantees: Sample of special warrantees.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

C. Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.

D. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.

E. Source Limitations for Aluminum-Framed Systems: Obtain from single source from single manufacturer.

F. Preinstallation Conference: Conduct conference at Project site.

1.9 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including, but not limited to, excessive deflection.
b. Noise or vibration caused by thermal movements.
c. Deterioration of metals, metal finishes and other materials beyond normal weathering.
d. Water leakage through fixed glazing and framing areas.
e. Failure of operating components.

2. Warranty Period: Ten (10) years from date of Substantial Completion.

B. Installers Warranty: Installation Contractor shall warranty the quality of all labor and workmanship associated with the installation of components of aluminum-frames systems.

1. Warrantee Period: Two (2) years from date of Substantial Completion.

C. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.

1. Warranty Period: Ten (10) years from date of Substantial Completion.

1.11 MAINTENANCE SERVICE

A. Entrance Door Hardware:

1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of entrance door hardware.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide the following products, or comparable product by approved manufacturer:

1. Exterior Entrance Doors: Kawneer Series 500, heavy wall, wide style, entrance.
2. Exterior Storefront System: Kawneer Trifab VersaGlaze 451T
   a. System Sight Line: 2 inch.
   b. System Depth: 4 1/2 inch.

B. Approved Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers. Obtain Architect’s approval of manufacturer and proposed system prior to Bid Opening.

1. EFCO Corporation.
2. Kawneer North America; an Alcoa company.
3. Other Manufacturers (Approval by Architect).

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Sheet and Plate: ASTM B 209.
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
3. Extruded Structural Pipe and Tubes: ASTM B 429.
4. Structural Profiles: ASTM B 308/B 308M.

B. Steel Reinforcement: Manufacturer's standard zinc rich, corrosion resistant primer, complying with SSPC-PS Guide No. 12.00, applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SO COM and prepare surfaces according to applicable SSPC standard.

1. Structural Shapes Plates, and Bars: ASTM (ASTM B 209MA 36/A 36M.
2. Cold Rolled Sheet and Strips: ASTM A 1008/ A 1008M.
3. Hot Rolled Sheet and Strip : ASTM A 1011/A 1011M.

2.3 FRAMING SYSTEMS

A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Thermally broken.
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Glazing Plane: Front.

B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with non-staining, nonferrous shims for aligning system components.

C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads**,** finished to match framing system, fabricated from stainless steel.

D. Concealed Flashing: Manufacturer's standard corrosion-resistant, non-staining, nonbleeding flashing compatible with adjacent materials of type recommended by manufacturer.

E. Framing System Gaskets and Sealants: Manufacturer's standard, recommended by manufacturer for joint type.

F. Hardware: Manufacturer’s standard weatherstripping.

2.4 GLAZING SYSTEMS

A. Glazing: As specified in Section 088000 "Glazing."

1. Multi-pane insulating glazing units, one inch (1”) unit thickness.

B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

2.5 ENTRANCE DOOR SYSTEMS

A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.

1. Door Construction: 2-inch overall thickness, with minimum 3/16-inch (4.8-mm) thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
2. Thermal Construction: High performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.
3. Door Design: Wide stile; 5-inchnominal width, 5” (127-mm)horizontal intermediate cross rails, and 8” bottom rail.
4. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.

a. Provide non-removable glazing stops on outside of door.
b. Face surface of glazing stop flush with face of door stile surface.

B. Entrance Door Hardware: As specified in Section 087100 "Door Hardware."

2.6 ENTRANCE DOOR HARDWARE

A. General: Install entrance door hardware sets indicated in Door Hardware Schedule for each door.

1. Furnish entrance door hardware sets indicated in Hardware Schedule utilizing "Hardware Contingency Allowance" for all hardware material costs.
2. Install entrance door hardware sets indicated in the Hardware Schedule with all labor included in the Base Bid scope of work.
3. Accessibility: Install and adjust all hardware to comply with ADA standards and guidelines.
4. The hardware shall be furnished by the hardware supplier and installed by the aluminum storefront entrance door manufacturer.
5. Hardware furnished and installed by the aluminum storefront entrance door manufacturer (minimum):
   a. Weatherstripping.

2.7 ACCESSORY MATERIALS

A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Section 079200 "Joint Sealants."

B. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-mil thickness per coat.

2.8 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Provisions for field replacement of glazing from interior for vision glass and exterior for spandrel glazing or insulated panels.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

C. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

D. Storefront Framing: Fabricate components for assembly using shear block system.

E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

1. At exterior doors, provide compression weather stripping at fixed stops.

F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
2. At exterior doors, provide weather sweeps applied to door bottoms.

G. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.9 ALUMINUM FINISHES

A. High Performance Organic Finish (Three-Coat Flouropolymer): AA C12C40R1x; Organic Coating: Manufacturer's standard three-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color coat and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturer's written instructions.

B. Color and Gloss: As selected by Architect from full range of industry colors and color densities.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.

5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
6. Seal joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Section 079200 "Joint Sealants" to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.

F. Install glazing as specified in Section 088000 "Glazing."

G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

H. Install perimeter joint sealants as specified in Section 079200 "Joint Sealants" to produce weathertight installation.

3.3 ERECTION TOLERANCES

A. Install aluminum-framed systems to comply with the following maximum erection tolerances:

1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet; 1/4 inch over total length.
2. Alignment:

a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch.
b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.

B. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.

3.4 ADJUSTING

A. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer.

1. Adjust all entrance door closers to meet applicable Accessibility code requirements.

END OF SECTION 084113

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Hardware Supplier:

1. The Bidder is required to include in the Base Bid amount all necessary costs related to the removal and reinstallation of existing door hardware and installing all new door hardware.
2. All door hardware will be furnished by the Hardware Supplier. The cost related to furnishing all new door hardware is covered by the Hardware Allowances. A materials, product descriptions, and the door hardware schedule is included in this section for the Contractor's use in determining hardware installation labor costs.
3. **No substitution of the hardware supplier, specified hardware manufacturers, or specified hardware products are permitted.**
4. Hardware Specifier: Anderson Lock
   1590 Touhy Avenue
   Elk Grove Vollage, IL 60007
   T.: 847-375-4291

1.2 SCOPE OF WORK

A. Install new hardware on new doors as indicated in the Contract Documents.

B. Remove and reinstall select existing door hardware as indicated in the Contract Documents.

C. Salvage all existing hardware not scheduled for reinstallation for Owner.

D. Clean, adjust and service all existing to remain hardware and all existing hardware scheduled for removal, salvage and reinstallation to insure proper operation.

1.3 SUBMITTALS

A. Installer Qualifications: Provide qualifications of installation contractor and / or installing personnel to the Architect for review.

B. Product Data: Manufacturer's data for each different piece of new and existing hardware, with installation instructions. Obtain from named hardware supplier and submit to the Architect, for approval.

C. Detailed Hardware Schedule: Obtain from hardware supplier and submit to Architect for approval. Show manufacturer's complete identification for every item for every door.

1. Cross-reference to item names and designations in contract documents.
2. Indicate door/frame materials and sizes.

3. Explain number codes and abbreviations.
4. Indicate hardware mounting heights or locations, if different from those specified.
5. Indicate finish for each item.
6. Preliminary schedule will be reviewed if accompanied by product data.

1.4 QUALITY ASSURANCE

A. Hardware for Fire Rated Doors: Tested for compliance with NFPA 80.

1. Listing in current classification publications of the following agencies will be considered evidence of acceptable testing:
   a. Underwriters Laboratories Inc. (UL).
2. Provide permanent labels on all hardware indicating the listing agency and conditions of the listing.

B. Installer Qualifications: The Installation Contractor or the installing personnel shall specialize in the installation of door hardware and shall have not less than five (5) years experience in the hardware installation.

C. Manufacturer Qualifications: Hardware manufacturer and specific hardware products selected for the Scope of Work of this Project have been selected by the Owner. No substitutions will be permitted.

1.5 HARDWARE SUPPLIER

A. The Hardware Supplier has prepared the generic hardware sets at the end of this section. After Contract award, the selected hardware supplier will:

1. Submit a complete hardware schedule to the Contractor.

B. After the Contract has been awarded, the Hardware Supplier will:

1. Submit a purchase order to the Contractor for the finish hardware as described in the contract documents for a specified contract price. The Hardware Allowance will be used for payment of the hardware furnished by the Hardware Supplier.
2. Submit aluminum, fiberglass, and hollow metal door and frame shop drawings so product compatibility can be verified by the hardware supplier.
2. Submit the hardware schedule and hardware product data for the review and approval by the Architect.
3. Provide schedules and templates after the approved hardware schedule has been received by the hardware supplier and the related trades' shop drawings have been reviewed.
4. The Contractor shall receive and store all hardware well in advance of installation. The hardware supplier will invoice for the materials that have been received and stored. Insurance certificates for all stored materials to will be provided to the Contractor.

C. The Contractor will provide the hardware supplier a complete project schedule at least two (2) weeks prior to date the hardware is required on job site. Subsequently, the hardware supplier will:

1. Provide a complete updated schedule indicating the proposed hardware shipment date(s).
2. Send a hardware specialist to the job site, after the hardware has been delivered, to review the hardware schedule with the installer and to clarify potential installation problems.
3. Send personnel to the job site to review the hardware installation Prior to Substantial Completion. Problems will be documented and a report provided to the Architect.
4. Provide warrantee certifying workmanship for a period of two (2) years from date of Substantial Completion.

1.6 PROJECT CONDITIONS

A. Sequence submittal of hardware schedule and door and frame submittals, allowing adequate time for review and resubmittal, if required, so that construction is not delayed; provide adequate information for review.

B. Provide hardware installation templates to installers of hardware and to fabricators of other work which is required to be prepared in the shop or factory for hardware installation.

C. Coordinate shop drawings of other work so that proper preparation is made.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver hardware at the times and to the locations required for timely installation.

B. Package each item separately or in container with items of same set only.

C. Mark each item or package with hardware set number from hardware schedule.

PART 2 - PRODUCTS

2.1 GENERAL HARDWARE REQUIREMENTS

A. Fire-Rated Doors: Provide hardware of types and quality required to comply with NFPA 80.

2.2 MATERIALS - GENERAL

A. Fasteners (New Hardware): Provide hardware prepared by the manufacturer with fastener holes for machine screws, unless otherwise indicated.
1. Provide all fasteners required for secure installation.
2. Select fasteners appropriate to substrate and material being fastened.

3. Use wood screws for installation in wood.
4. Exposed screws: Match hardware finish.

B. Fasteners (Existing Hardware): Existing hardware to be reinstalled in like manner and in accordance with manufacturer's recommendations. Salvaged hardware shall be issued to the Owner. Individually package each hardware device with all fasteners and accessories.

C. Finishes: Match building standard.

2.3 LOCK CYLINDERS AND KEYING

A. Construction Cylinders: Provide removable Small Format Interchangeable Core (SFIC) for temporary construction cores.

B. Permanent Cylinders: Final cylinders and keying will be furnished and installed by Owner. All new lock cylinders and keying shall be compatible and match Owner's existing keying system at each facility.

2.4 ACCEPTABLE HARDWARE MANUFACTURERS AND MATERIALS

A. Manufacturer's and products as selected by Owner/Architect to match District standards.

PART 3 - EXECUTION

3.1 PREPARATION

A. Factory- or shop-prepare all work for installation of hardware.

3.2 INSTALLATION

A. Follow hardware manufacturer's recommendations and instructions.

B. Provide the services of the selected architectural hardware consultant (AHC) to advise on proper installation, to inspect the finished work, and either to adjust or to instruct those who are adjusting.

C. Mount at heights specified in the Door and Hardware Institute's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

1. Exception(s):
   a. As required by applicable regulations.
   b. All door hardware must be installed at heights sand locations required by the Americans with Disabilities Act (ADA).
   c. All hardware must operate in compliance with the Americans with Disabilities Act (ADA).

D. Install hardware in correct location, plumb and level.

E. Reinforce substrates as required for secure attachment and proper operation.

F. All doors and frames shall be drilled and tapped for door hardware fastener installation. No self-tapping screws will be permitted.

G. The Contractor is responsible for providing all necessary low-voltage electrical work related to maintaining existing and connecting new electronic door hardware, new connections to fire alarm systems, and maintaining existing and new low voltage cabling and wiring in operational condition until Substantial Completion. Verify all requirements on the Drawings and in the field prior to bidding.

1. Low-voltage wiring feeds and connections between new power supplies, electronic power transfers, electronic exit devices, and existing (removed and reinstalled) proximity card readers.
2. Provide low-voltage wiring and pull cords between new doors, new electronic power transfers, and ceiling cavity mounted power supply to be furnished and installed by others at a future date.

3.3 ADJUSTMENT

A. Adjust each operable unit for correct function and smooth, free operation.

B. Adjust door closers to overcome air pressure produced by HVAC systems.

PART 4 - HARDWARE SCHEDULE

1. HARDWARE SET - HS1
(NEW DOOR / EXISTING FRAME)

New Hardware
1 WIRELESS LOCKSET
1 MORTISE CYLINDER
1 CONTINUOUS HINGE
3 HINGE FILLER
1 DOOR CLOSER
1 WALL STOP

Scope of Work
Remove existing door and hardware. Furnish and install new door and hardware. Patch exposed hardware fastener holes from removed hardware.

2. HARDWARE SET - HS2
(NEW DOOR / EXISTING FRAME)

New Hardware
1 WIRELESS LOCKSET
1 MORTISE CYLINDER
1 CONTINUOUS HINGE
3 HINGE FILLER
1 DOOR CLOSER (CUSH ARM)

Scope of Work
Remove existing door and hardware. Furnish and install new door and hardware. Patch exposed hardware fastener holes from removed hardware.

3. HARDWARE SET - HS3
(EXISTING DOOR / EXISTING FRAME)

New Hardware
2 MORTISE CYLINDER

Scope of Work
Remove and replace existing cylinders.

4. HARDWARE SET - HS4
(EXISTING DOOR / EXISTING FRAME)

New Hardware
1 WIRELESS LOCKSET
1 MORTISE CYLINDER

Scope of Work
Remove and replace existing mortise lockset.

5. HARDWARE SET - HS5A
(EXISTING DOOR / EXISTING FRAME)

New Hardware
1 EXIT DEVICE
3 BUTT HINGES

Scope of Work
Remove and replace existing exit device and butt hinges.
Remove and reinstall electronic hold open device.
Patch exposed hardware fastener holes from removed hardware.

Existing Hardware (Remove and Reinstall)
1 ELECTRONIC DOOR HOLD OPEN

5. HARDWARE SET - HS5B
(EXISTING DOOR / EXISTING FRAME)

New Hardware
1 EXIT DEVICE
3 BUTT HINGES
1 DOOR PULL / PLATE
1 ELECTRIC STRIKE
1 CYLINDER LOCK

Existing Hardware (Remove and Reinstall)
1 ELECTRONIC DOOR HOLD OPEN

Scope of Work
Remove and replace existing door hardware.
Remove and reinstall electronic hold open device.
Patch exposed hardware fastener holes from removed hardware.
Refer to Electrical Drawings for card reader and low voltage wiring scope of work.

5. HARDWARE SET - HS5C
(NEW DOOR / EXISTING FRAME)

New Hardware
1 EXIT DEVICE
3 BUTT HINGES

Scope of Work
Remove and replace existing door and hardware.
Remove and reinstall electronic hold open device.
Patch exposed hardware fastener holes from removed hardware.

Existing Hardware (Remove and Reinstall)
1 ELECTRONIC DOOR HOLD OPEN

5. HARDWARE SET - HS5D
(NEW DOOR / EXISTING FRAME)

New Hardware
1 EXIT DEVICE
3 BUTT HINGES
1 DOOR PULL / PLATE
1 ELECTRIC STRIKE
1 CYLINDER LOCK

Existing Hardware (Remove and Reinstall)
1 ELECTRONIC DOOR HOLD OPEN

Scope of Work
Remove and replace existing door and hardware.
Remove and reinstall electronic hold open device.
Patch exposed hardware fastener holes from removed hardware.
Refer to Electrical Drawings for card reader and low voltage wiring scope of work.

6. HARDWARE SET - HS6A
(NEW DOOR / EXISTING FRAME)

New Hardware
1 EXIT DEVICE
3 BUTT HINGES
1 DOOR CLOSER
1 FLOOR STOP / WALL STOP

Scope of Work
Remove and replace existing door and hardware.
Patch exposed hardware fastener holes from removed hardware.

6. HARDWARE SET - HS6B
(NEW DOOR / EXISTING FRAME)

New Hardware
1 EXIT DEVICE
3 BUTT HINGES
1 DOOR CLOSER
1 DOOR PULL / PLATE
1 ELECTRIC STRIKE
1 CYLINDER LOCK
1 FLOOR STOP / WALL STOP

Scope of Work
Remove and replace existing door and hardware.
Patch exposed hardware fastener holes from removed hardware.
Refer to Electrical Drawings for card reader and low-voltage wiring scope of work.

6. HARDWARE SET - HS6C
(NEW DOOR / EXISTING FRAME)

New Hardware
1 EXIT DEVICE
3 BUTT HINGES
1 DOOR CLOSER (HOLD OPEN)
1 DOOR PULL / PLATE
1 ELECTRIC STRIKE
1 CYLINDER LOCK
1 WALL STOP

Scope of Work
Remove and replace existing door and hardware..
Patch exposed hardware fastener holes from removed hardware.
Refer to Electrical Drawings for card reader and low-voltage wiring scope of work.

6. HARDWARE SET - HS6D
(NEW DOOR / EXISTING FRAME)

New Hardware
1 EXIT DEVICE
3 BUTT HINGES
1 DOOR CLOSER (HOLD OPEN)
1 DOOR PULL / PLATE
1 ELECTRIC STRIKE
1 CYLINDER LOCK
1 FLOOR STOP

Scope of Work
Remove and replace existing exit device and butt hinges. Install electric strike.
Refer to Electrical Drawings for card reader and low-voltage wiring scope of work.

6. HARDWARE SET - HS6E
(NEW DOOR / NEW FRAME)

New Hardware
1 EXIT DEVICE
3 BUTT HINGES
1 DOOR CLOSER CUSH ARM (HOLD OPEN)

Scope of Work
Remove and replace existing door and hardware..

6. HARDWARE SET - HS6F
(NEW DOOR / NEW FRAME)

New Hardware
1 EXIT DEVICE
3 BUTT HINGES
1 DOOR CLOSER (HOLD OPEN)
1 DOOR PULL / PLATE
1 ELECTRIC STRIKE
1 CYLINDER LOCK
1 WALL STOP

Scope of Work
Remove and replace existing door, frame, and hardware..
Refer to Electrical Drawings for card reader and low-voltage wiring scope of work.

7. HARDWARE SET - HS7
(EXISTING DOOR / EXISTING FRAME)

New Hardware
1 WIRELESS LOCKSET
1 MORTISE CYLINDER
1 DOOR CLOSER

Scope of Work
Remove and replace existing mortise lockset and butt hinges.
Patch exposed hardware fastener holes from removed hardware.

8. HARDWARE SET - HS8
(NEW DOOR / EXISTING FRAME)

New Hardware
1 WIRELESS LOCKSET
1 MORTISE CYLINDER
3 BUTT HINGES
1 OCCUPANCY INDICATOR / CYLINDER LOCK

Scope of Work
Remove existing door and hardware. Furnish and install new door and hardware.
Patch exposed hardware fastener holes from removed hardware.
Modify frame for cylinder lock bolt.

10. HARDWARE SET - HS10
(NEW DOOR / NEW FRAME)

New Hardware
1 CONTINUOUS HINGE
1 DOOR PULL / PUSH PLATE
1 MORTISE CYLINDER (DOUBLE)
1 DOOR CLOSER
1 CLOSER DROP PLATE
1 THRESHOLD
1 DOOR SWEEP
1 WEATHERSTRIPPING*

Scope of Work
Remove and replace existing doors, frames, and hardware.

11. HARDWARE SET - HS11A
(NEW DOOR / NEW FRAME)

New Hardware
1 CONTINUOUS HINGE
1 EXIT DEVICE / DOOR PULL / PLATE
1 DOOR CLOSER
1 CLOSER DROP PLATE
1 THRESHOLD
1 DOOR SWEEP
1 WEATHERSTRIPPING *

Scope of Work
Remove and replace existing doors, frames, and hardware.

11. HARDWARE SET - HS11B
(NEW DOOR / NEW FRAME)

New Hardware
1 CONTINUOUS HINGE
1 EXIT DEVICE / DOOR PULL / PLATE
1 DOOR CLOSER
1 CLOSER DROP PLATE
1 ELECTRIC STRIKE
1 MORTISE CYLINDER
1 THRESHOLD
1 DOOR SWEEP
1 WEATHERSTRIPPING *

Scope of Work
Remove and replace existing doors, frames, and hardware.
Refer to Electrical Drawings for card reader and low voltage wiring scope of work.

11. HARDWARE SET - HS11C
(NEW DOOR / NEW FRAME)

New Hardware
1 CONTINUOUS HINGE
1 EXIT DEVICE / DOOR PULL / PLATE
1 DOOR CLOSER
1 CLOSER DROP PLATE
1 MORTISE CYLINDER
1 THRESHOLD
1 DOOR SWEEP
1 WEATHERSTRIPPING*

Existing Hardware (Remove and Reinstall)
1 CARD READER (DOOR FRAME MOUNTED)
1 ELECTRIC STRIKE

Scope of Work
Remove and replace existing doors, frame, and hardware.
Remove and reinstall existing frame mounted electric strike and card reader.
Refer to Electrical Drawings for card reader and electric strike low voltage wiring scope of work.

12. HARDWARE SET - HS12
(NEW DOOR / NEW FRAME)

New Hardware
1 WIRELESS LOCKSET
1 MORTISE CYLINDER
3 BUTT HINGES

Scope of Work
Furnish and install new door, frame, and hardware.

13. HARDWARE SET - HS13
(EXISTING DOOR / EXISTING FRAME)

New Hardware
1 MORTISE CYLINDER (DOUBLE)

Scope of Work
Remove and replace existing hardware.

14. HARDWARE SET - HS14A
(FACULTY RESTROOM)
(NEW DOOR / EXISTING FRAME)

New Hardware
3 BUTT HINGES
1 WIRELESS LOCKSET
1 MORTISE CYLINDER
1 DOOR CLOSER
1 OCCUPANCY INDICATOR / CYLINDER LOCK
1 WALL STOP

Scope of Work
Remove existing door and hardware. Furnish and install new door and hardware.
Patch existing hardware fastener holes from removed hardware.
Modify door frame for cylinder lock strike.

14. HARDWARE SET - HS14B
(FACULTY RESTROOM)
(NEW DOOR / NEW FRAME)

New Hardware
3 BUTT HINGES
1 WIRELESS LOCKSET
1 MORTISE CYLINDER
1 DOOR CLOSER
1 OCCUPANCY INDICATOR / CYLINDER LOCK
1 WALL STOP

Scope of Work
Furnish and install new door, frame, and hardware.

15. HARDWARE SET - HS15
(NEW DOOR / EXISTING FRAME)

New Hardware
1 PULL / PLATE
1 EXIT DEVICE
1 CONTINUOUS HINGE
3 HINGE FILLER
1 DOOR CLOSER
1 OVERHEAD STOP
1 REMOVABLE MULLION (KEY) (ELECTRIC STRIKE WIRING)
1 ELECTRIC STRIKE

Scope of Work
Remove existing door and hardware. Furnish and install new door and hardware.
Patch exposed hardware fastener holes from removed hardware.
Refer to Electrical Drawings for card reader low voltage wiring scope of work.

16. HARDWARE SET - HS16
(NEW DOOR / EXISTING FRAME)

New Hardware
1 EXIT DEVICE
1 CONTINUOUS HINGE
3 HINGE FILLER
1 DOOR CLOSER
1 OVERHEAD STOP

Scope of Work
Remove existing door and hardware. Furnish and install new door and hardware.
Patch exposed hardware fastener holes from removed hardware.

17. HARDWARE SET - HS17
(NEW DOOR / EXISTING FRAME)

New Hardware
1 WIRELESS LOCKSET
1 MORTISE CYLINDER
1 CONTINUOUS HINGE
3 HINGE FILLER
1 DOOR CLOSER (180 HO)
1 WALL STOP

Scope of Work
Remove existing door and hardware. Furnish and install new door and hardware.
Modify existing frame for new lockset strike plate.

18. HARDWARE SET - HS18A
(EXISTING DOOR / EXISTING FRAME)

New Hardware
1 WIRELESS LOCKSET
1 MORTISE CYLINDER
1 DOOR CLOSER (90 HO)

Scope of Work
Remove and replace existing door hardware.
Patch existing exposed hardware fastener holes from removed hardware.

18. HARDWARE SET - HS18B
(EXISTING DOOR / EXISTING FRAME)

New Hardware
1 WIRELESS LOCKSET
1 MORTISE CYLINDER
1 DOOR CLOSER (180 HO)

Scope of Work
Remove and replace existing door hardware.
Patch existing exposed hardware fastener holes from removed hardware.

19. HARDWARE SET - HS19
(EXISTING DOOR / EXISTING FRAME)

New Hardware
1 WIRELESS LOCKSET
1 MORTISE CYLINDER
1 KICK PLATE

Scope of Work
Remove and replace existing door hardware.
Patch existing exposed hardware fastener holes from removed hardware.

20. HARDWARE SET - HS20
(NEW DOOR / EXISTING FRAME)

New Hardware
1 DOOR CLOSER (HO)
1 MORTISE CYLINDER LOCK

Scope of Work
Remove and replace existing door and hardware.
Patch exposed hardware fastener holes from removed hardware.

21. HARDWARE SET - HS21
(NEW DOORS / EXISTING FRAME)

New Hardware
6 BUTT HINGES
2 DOOR CLOSER (HO)
2 KICK PLATE (34" H. X 35" W.)
2 WALL STOP

Scope of Work
Remove existing doors and hardware. Furnish and install new doors and hardware.
Patch exposed hardware fastener holes from removed hardware.

22. HARDWARE SET - HS22
(EXISTING DOOR / EXISTING HARDWARE / EXISTING FRAME)

New Hardware
1 DOOR SWEEP

Scope of Work
Remove and replace existing door hardware.

23. HARDWARE SET - HS23
(NEW DOOR / NEW FRAME) (42" LEAF / 30" LEAF)

New Hardware
1 CONTINUOUS HINGE
(PROVIDE CUTOUT FOR EPT)
1 CONCEALED LEAF-CONTINUOUS HINGE
1 ELECTRIC POWER TRANSFER
1 EXIT DEVICE (ELECTRONIC / MORTISE LOCKSET (OR ELECTRIC STRIKE)
1 POWER SUPPLY
1 CYLINDER
2 DOOR CLOSER (WITH HOLD OPEN)
1 TOP AND BOTTOM SURFACE BOLTS
1 ASTRAGAL
2 KICKPLATE
2 WEATHERSTRIP (SET)
2 DOOR SWEEP
1 THRESHOLD
1 DRIP CAP

Existing Hardware
1 CARD READER

Scope of Work
Remove existing doors, frame, and hardware. Furnish and install new doors, frame, and hardware.
Reinstall frame mounted card reader.
Refer to Electrical Drawings for card reader and low voltage wiring scope of work.

24. HARDWARE SET - HS24
(NEW DOORS / NEW FRAME)

New Hardware
2 CONTINUOUS HINGE
2 EXIT DEVICE
2 DOOR CLOSER
1 THRESHOLD
1 WEATHERSTRIP
1 DOOR SWEEP
1 DRIP CAP

Scope of Work
Remove existing doors, frame and hardware. Furnish and install new doors, frame, and hardware.

25. HARDWARE SET - HS25
(NEW DOORS / NEW FRAME)

New Hardware
2 CONTINUOUS HINGE
1 MORTISE LOCKSET
1 CYLINDER LOCK
1 FLUSH BOLTS (T/B)
1 DOOR CLOSER
1 ASTRAGAL
1 THRESHOLD
1 WEATHERSTRIP
1 DOOR SWEEP
1 DRIP CAP

Scope of Work
Remove existing doors, frame and hardware. Furnish and install new doors, frame, and hardware.

26. HARDWARE SET - HS26A
DOOR OPENING
(NEW DOOR / NEW FRAME)

New Hardware
1 WIRELESS LOCKSET
1 MORTISE CYLINDER
3 BUTT HINGES
1 DOOR CLOSER (HO)
1 WALL STOP

Scope of Work
Furnish and install new door, frame, and hardware.

26. HARDWARE SET - HS26B
DOOR OPENING
(NEW DOOR / NEW FRAME)

New Hardware
1 WIRELESS LOCKSET
1 MORTISE CYLINDER
3 BUTT HINGES
1 DOOR CLOSER
1 WALL STOP

Scope of Work
Furnish and install new door, frame, and hardware.

27. HARDWARE SET - HS27
(EXISTING DOOR / EXISTING FRAME)

New Hardware
1 WIRELESS LOCKSET
1 MORTISE CYLINDER
1 AUTOMATIC FLUSH BOLTS
1 DOOR COORDINATOR

Scope of Work
Remove and replace existing mortise lockset. Install new door hardware.
Patch exposed hardware fastener holes from removed hardware.
Modify existing kick plate (Door E11.2 Only)

28. HARDWARE SET - HS28
(EXISTING DOOR AND FRAME)

New Hardware
3 BUTT HINGE

Scope of Work
Remove and replace existing butt hinges.

29. HARDWARE SET - HS29
(EXISTING DOOR / EXISTING FRAME)

New Hardware
1 ELECTRIC STRIKE

Scope of Work
Install new door hardware.
Refer to Electrical Drawings for card reader and low voltage wiring scope of work.

30. HARDWARE SET - HS30
NEW DOOR AND FRAME

New Hardware
3 BUTT HINGES
1 CYLINDER LOCK
1 DOOR CLOSER
1 THRESHOLD
1 WEATHERSTRIP
1 DOOR SWEEP
1 DRIP CAP

Scope of Work
Remove existing doors, frame and hardware. Furnish and install new doors, frame, and hardware.

PART 5 - HARDWARE PRODUCTS

5.1 FINISH HARDWARE SELECTION

A. The Hardware Supplier is solely responsible for the selection of the finish hardware manufacturer and specific product numbers to be furnished under the Hardware Allowance for installation by the Contractor as scope of work of this Contract.

END OF SECTION 087100

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Glazing: Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. New and existing aluminum window frames.
2. New hollow metal doors and frames.
3. New wood doors and wood frames.

B. Insulated Panels: Section includes removal and replacement of existing exterior insulated panels.

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. Interspace: Space between lites of an insulating-glass unit.

1.4 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Delegated Design: Design glass, including comprehensive engineering analysis according to ASTM E 1300 and ICC's 2003 International Building Code by a qualified professional engineer, using the following design criteria:

1. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
   a. Basic Wind Speed: 90 mph.
   b. Importance Factor: 1.15.
   c. Exposure Category: B.
2. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.

3. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

1.5 ACTION SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Glass Samples: For each type of glass product, including the following products; 12 inches square.

1. Tinted glass.
2. Translucent glass.
3. Laminated glass.
4. Insulating glass.

C. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For installers and manufacturers of insulating-glass units with , low-e coatings,, glass testing agency and sealant testing agency.

B. Product Certificates: For glass and glazing products, from manufacturer.

C. Warranties: Sample of special warranties.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications for Insulating-Glass Units with Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.

B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

E. Source Limitations for Glass: Obtain laminated glass and insulating glass from single source from single manufacturer for each glass type.

F. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

G. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA's "Laminated Glazing Reference Manual" and GANA's "Glazing Manual."
2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

H. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

I. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F.

1.10 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: Ten (10**)** years from date of Substantial Completion.

B. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: Ten (10**)** years from date of Substantial Completion.

C. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: Ten (10**)** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

1. Minimum Glass Thickness for Exterior Lites: Not less than 1/4 inch.
2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites of thickness indicated.
2. For laminated-glass lites, properties are based on products of construction indicated.
3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
4. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
5. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
6. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.2 GLASS PRODUCTS

A. Tempered Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated, of kind and condition indicated.

B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
2. For uncoated glass, comply with requirements for Condition A.
3. For coated vision glass, comply with requirements for Condition C (other coated glass).

C. Tempered Tinted Float Glass: Class 2, complying with other requirements specified.

1. Basis-of-Design Product: Subject to compliance with requirements, available products that may be incorporated into the Work, shall be comparable to the following:

a. PPG Industries, Solargray+Solarban 60

2. Tint Color: Gray.
3. Visible Light Transmittance: 35percent minimum.

2.3 LAMINATED GLASS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Old Castle
2. Viracon.

B. Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Construction: Laminate glass with polyvinyl butyral interlayer
2. Interlayer Thickness: .060 inch.
3. Interlayer Color: Clear.

C. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Laminated-Glass Types" Article.

2.4 INSULATING GLASS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Old Castle
2. Viracon.

B. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.

1. Sealing System: Dual seal, with manufacturer's standard polyisobutylene and silicone primary and secondary.
2. Spacer: Manufacturer's standard spacer material and construction]
3. Desiccant: Molecular sieve or silica gel, or blend of both.

C. Glass: Comply with applicable requirements in "Glass Products" Article and in "Laminated Glass" Article as indicated by designations in "Insulating-Glass Types" Article and in "Insulating-Laminated-Glass Types" Article.

2.5 GLAZING GASKETS

A. Dense Compression Gaskets: Manufacturer’s standard molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:

1. Neoprene complying with ASTM C 864.
2. EPDM complying with ASTM C 864.
3. Silicone complying with ASTM C 1115.
4. Thermoplastic polyolefin rubber complying with ASTM C 1115.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene, EPDM, silicone or thermoplastic polyolefin rubber gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.

1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

2.6 GLAZING SEALANTS

A. General:

1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Sealants used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.

1. Products: Subject to compliance with requirements available products that may be incorporated into the Work include, but are not limited to, the following:

a. Dow Corning Corporation: 795.

2.7 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; non-staining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.8 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.9 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

2.10 LAMINATED-GLASS TYPES

A. Glass Type L1: Clear laminated glass with two plies of heat-strengthened float glass.

1. Overall Unit Thickness: 5/16 inch

a. 1/8” clear, heat strengthened float glass.
b. PVB interlayer, .060 inch.
c. 1/8” clear, heat strengthened float glass.

2. Provide laminate glazing labeling.

B. Glass Type L2: Obscure laminated glass with two plies of heat-strengthened float glass.

1. Overall Unit Thickness: 5/16 inch, laminated.

a. 1/8” obscure, heat strengthened float glass. (Indoor).
b. PVB interlayer, .060 inch.
c. 1/8” clear, heat strengthened float glass (Outdoor).

2. Provide laminate glazing labeling.

2.11 INSULATING-GLASS TYPES

A. Glass Type L3: Clear insulating laminated glass.

1. Overall Unit Thickness: 1 inch.
2. Thickness of Each Glass Lite: 5/16 inch and 1/4 inch.
3. Outdoor Lite: Clear, 5/16 inch, laminated.

a. 1/8” obscure, heat strengthened float glass. (Indoor).
b. PVB interlayer, .060 inch.
c. 1/8” clear, heat strengthened float glass (Outdoor).

4. Interspace Content: Argon.
5. Indoor Lite: Clear, 1/4 inch, fully tempered float glass.
6. Provide laminate glazing labeling.

B. Glass Type L4: Clear insulating, Low-E-coated, laminated glass.

1. Overall Unit Thickness: 1 inch.
2. Thickness of Each Glass Lite: 5/16” and 1/4 inch.
3. Outdoor Lite: Clear, 5/16 inch, laminated.

a. 1/8” obscure, heat strengthened float glass. (Indoor).
b. PVB interlayer, .060 inch.
c. 1/8” clear, heat strengthened float glass (Outdoor).

4. Interspace Content: Argon.
5. Indoor Lite: Clear, 1/4 inch, fully tempered float glass.

6. Low-E Coating: Pyrolytic on third surface.
7. Provide laminate glazing labeling.

2.12 TEMPERED GLASS TYPES

A. Glass Type T1: Clear, heat-strengthened float glass.

1. Overall Lite Thickness: 1/4 inch
B. Provide safety glazing labeling.

2.13 INSULATED PANELS

A. Insulated Panel Type IP: Clad insulated panel.

1. Overall Thickness: 1 inch
2. Face / Back: 0.40 inch, polyester or anodized finish to match framing.
3. Core: Hardboard and Expanded Polystyrene.

B. Manufacturer: CAP Industries, Inc., ALCLAD Insulated 1” Panel or Aluminum storefront manufacturer insulated 1” Panel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches.

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 LOCK-STRIP GASKET GLAZING

A. Comply with ASTM C 716 and gasket manufacturer's written instructions. Provide supplementary wet seal and weep system unless otherwise indicated.

3.8 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 088000

SECTION 091100 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Existing interior and exterior paint products have been tested for lead containment. The results of those tests are included in this Specification Section.

1.2 SUMMARY

A. This Section generally includes surface preparation and the application of paint systems on the following interior and exterior substrates:

1. Concrete Masonry Units (CMU), both new and existing, interior.
2. Existing painted surfaces.
3. Existing exterior cementitious plaster soffit.
4. Existing interior gypsum board partition surfaces.
5. New and existing hollow metal doors and frames and window frames.
6. Existing exterior steel pipe railing and bollards.
7. Existing exterior steel lintels.
8. Exterior aluminum storefront window framing.

1.3 SCOPE OF WORK

A. **Building Exterior:** Existing surfaces to be patched, prepared, and receive paint application includes all surfaces indicated, including currently painted surfaces, products, where specified, including the following:

1. Exterior building soffit surface finishes. (Deer Path School)
2. Exterior pipe railings and bollards. (Deer Path School)
3. Exterior steel window and opening lintels. Deer Path School)
4. Aluminum storefront window framing (Exterior surfaces). (Deer Path School)

B. **Building Interior:** New and existing surfaces to be patched, prepared, and receive paint application includes all surfaces indicated, including currently painted surfaces, products where specified, including the following:

1. **Deer Path School**
   a. ALL existing and new interior CMU partitions, except in areas noted otherwise (i.e., ETR). Existing ceiling height – 9’-0”.
   b. ALL existing and new interior hollow metal doors, door frames, and hollow metal window frames.

c. ALL existing and new interior gypsum board partition and ceiling surfaces. Existing ceiling height – 9’-0”.
d. Existing CMU partitions with new infill CMU. Provide patching and painting of entire partition surface.
e. Existing CMU partitions and gypsum board soffits affected construction activities. Provide patching and touch-up painting to match.
f. Existing painted partition surfaces affected by demolition and new construction activities.
g. All existing painted surfaces which are damaged in the performance of the work. Provide patching and touch-up painting to match.
h. All new exposed to view electrical system components surface mounted on existing or new surfaces indicated to be receive paint.
i. Refer to Finish Plans and Enlarged Plans for additional specific painting scope of work requirements.

2. Three Oaks School

a. ALL existing interior CMU partitions, except in areas noted otherwise (i.e., ETR). Existing ceiling height – 9’-0”.
b. ALL existing and new hollow metal doors, door frames, and hollow metal window frames.
c. Existing CMU partitions and gypsum board soffits affected construction activities. Provide patching and touch-up painting to match.
d. Existing painted partition surfaces affected by demolition and new construction activities.
e. All existing painted surfaces which are damaged in the performance of the work. Provide patching and touch-up painting to match.
f. All new exposed to view electrical system components surface mounted on existing or new surfaces indicated to be receive paint.

1.4 SCOPE OF WORK (PREPARATION)

A. Provide selective demolition of existing materials, equipment and devices to the extent indicated on the Contract Drawings and the “Selective Demolition” Specification Section.

B. Provide application of new paint finishes prior to the installation (or reinstallation) of existing wall-mounted equipment and devices, including:

1. Door hardware (New and replacement).
2. New casework installation.
3. Tackboards, tackstrips, and markerboards.
4. Toilet accessories, including soap dispensers, paper towel dispensers, toilet paper dispensers, grab bars, toilet partitions, and mirrors.
5. Rubber floor base.
6. Electrical and low-voltage raceways, receptacle cover plates, equipment covers or trim.
7. Wall mounted equipment.

C. Painting Contractor, Paint Manufacturer Representative, General Contractor, Owner and Architect to review the quality and thoroughness of surface preparation prior to the application of new paint finishes.

D. Painting Contractor and General Contractor to review and approve the quality of all existing surface patching prior to the application of new paint finishes.

E. Provide the following existing or new surface preparation prior to the application of new paint finishes:
   1. Remove all loose or scaling paint.
   2. Wash, wire brush and/or sand surfaces to remove all surface grease and foreign materials.

1.5 SCOPE OF WORK (GENERAL)

A. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

   1. Pre-finished items and factory-finished components which are not to be painted include, but are not limited to the following factory-finished components:
      a. Sheet metal flashing and copings.
      b. Aluminum doors and frames.
      c. Aluminum windows.
      d. Door hardware.
      e. Glazing.
      f. Signs.
      g. Fire extinguisher cabinets.
      h. Finished mechanical and electrical equipment.
      i. Light fixtures.
      j. Fire alarm system devices.
      k. Intercom / clock system devices.
      l. Sound system devices.

   2. Finished metal surfaces include the following:
      a. Anodized aluminum.
      b. Stainless steel.
      c. Chromium plate.
      d. Copper and copper alloys.
      e. Bronze and brass.

   3. Operating parts include moving parts of operating equipment and the following:
      a. Valve and damper operators.
      b. Linkages.
      c. Sensing devices.
      d. Motor and fan shafts.

   4. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

B. Provide additional paint coat applications on surface of new CMU used as infill in existing CMU partitions to provide visual match between new and existing CMU.

1.6 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of topcoat product indicated.

C. Samples for Verification: For each type of paint system and each color and gloss of topcoat indicated.

1. Submit Samples on rigid backing, 8 inches square.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.7 QUALITY ASSURANCE

A. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.9 PROJECT CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.10 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.

1. Quantity: Furnish but not less than two (2) gallons of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Sherwin-Williams Company (The).

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. Colors: As selected by Architect from manufacturer's full range

2.3 INTERIOR CMU

A. Interior Block Filler/Primer: SW PrepRite Block Filler or Loxon Block Surfacer

B. Interior Block Bonding Primer: SW Extreme Bond

C. Finish: Interior Latex (Semi-Gloss): SW Promar 200 Zero VOC Interior Latex

2.4 EXTERIOR PLASTER

A. Exterior Latex Block Filler / Bonding Primer: Loxon Concrete & Masonry Primer Sealer

B. Finish (Low-Luster or Satin): SW Loxon Self-Cleaning Acrylic

2.5 METAL (INTERIOR)

A. Primer: Bonding Primer: SW Pro Industrial Pro-Cryl Universal Primer

B. Finish (Semi-Gloss): Pro Industrial Pre-Catalyzed Waterbased Epoxy

2.6 METAL (EXTERIOR)

A. Primer: Acrylic: SW Pro Industrial DTM Acrylic Primer

B. Finish: Acrylic Latex (Satin): SW Pro Industrial DTM Acrylic

2.7 GYPSUM BOARD (INTERIOR)

A. Primer: Interior Late Primer: SW ProMar 200 Zero VOC Latex Primer

B. Finish: Interior Latex (Eggshell and Flat): SW ProMar 200 Zero VOC Interior Latex.

2.8 ALUMINUM (EXTERIOR)

A. Primer: PPG Industries Coraflon ADS Epoxy Intermediate Primer, ADS 573/574.

B. Finish: PPG Industries Coraflon ADS Finish

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (CMU): 12 percent.
3. Wood: 15 percent.
4. Gypsum Board: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.

G. Existing Hollow Metal (Doors and Frames) Substrates: Remove all rust, loose paint, and surface imperfections with by power sanding all surfaces. Obtain Owner and Architect review of hollow metal surface preparation prior to application of new paint finish.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Glazing and glazing stop removal: Provide removal of existing glazing and glazing stops, for indicated locations, to permit complete removal and/or coverage of all existing paint.

J. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

K. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

3.3 APPLICATION

A. Provide quantity of prime and finish coat application specified in the Drawings and/or as required for proper and appropriate coverage.

B. The painting contractor shall prepare a schedule for all prime and finish coat applications. The painting contractor shall notify the Contractor and Architect upon completion of the prime coat and each finish coat application.

1. The painting contractor’s failure to provide the required notification after each successive paint coat application will result in additional paint application to insure compliance with the Contract requirements at no cost to the Owner.

C. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.

D. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

E. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

F. Provide one (1) prime and two (2) finish coat paint application for lower 10-inches on interior surfaces of new hollow metal door frames.

G. New paint application on new hollow metal doors and frames to be applied prior to the installation of new door hardware.

H. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

I. All existing materials and surfaces, where the extent of surface preparation exposes the original material, shall receive localized prime paint application prior to finish paint application.

3.4 FIELD QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:

1. Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
2. Testing agency will perform tests for compliance of paint materials with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 PAINTING SCHEDULE

A. Paint systems in this Article are based on "MPI Architectural Painting Specification Manual" (hereafter, "MPI Manual"). For renovation projects, consult "MPI Maintenance Repainting Manual" and revise paint systems accordingly.

B. Coordinate substrates and paint systems retained in this Article with products retained in Part 2.

C. CMU / Concrete Substrates:

1. Latex Over Alkali-Resistant Primer System: MPI EXT 4.2L.

a. Prime Coat: Alkali-resistant primer.
b. Intermediate Coat: Exterior latex matching topcoat.
c. Topcoat: Exterior latex semi-gloss, or to match existing.

D. Steel Substrates:

1. Alkyd System: MPI EXT 5.1D.

a. Prime Coat: Alkyd anticorrosive metal primer.
b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
c. Topcoat: Exterior alkyd enamel semi-gloss.

E. Gypsum Board Substrates:

1. Latex System: MPI EXT 9.2A.

a. Prime Coat: Exterior latex matching topcoat.
b. Intermediate Coat: Exterior latex matching topcoat.
c. Topcoat: Exterior latex to match existing.

F. Other Substrates (Unless Noted Otherwise):

1. Latex System / Alkyd Systems.

a. Provide manufacturer recommended products appropriate for application.

END OF SECTION 091100

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Interior gypsum board partitions.

B. Related Sections include the following:

1. Division 09 “Painting” Section for finishes applied to gypsum board surfaces.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install interior products until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PANELS, GENERAL

A. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.2 INTERIOR GYPSUM BOARD

A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. G-P Gypsum.
   b. National Gypsum Company.
   c. USG Corporation.

B. Abuse-Resistant / Moisture Resistant Type: Manufactured to produce greater resistance moisture and to surface indentation, through-penetration (impact resistance), and abrasion.

1. Core: 5/8 inch, and thickness to match existing for selective demolition and infill of existing to remain partitions.
2. Long Edges: Tapered.

2.3 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc.
2. Shapes:
   a. Cornerbead.
   b. L-Bead: L-shaped; exposed long flange receives joint compound.
   c. Expansion (control) joint.

2.4 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Wallboard: Paper.

C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints**,** beveled panel edges**,** and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
   a. Use setting-type compound for installing paper-faced metal trim accessories.
3. Fill Coat: For second coat, use all-purpose compound.
4. Finish Coat: For third coat, use all-purpose compound.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. High-Impact / Moisture Resistant: Manufacturer’s Standard in all locations, unless indicated otherwise.

B. Single-Layer Application:

1. Apply panels perpendicular to supports, with end joints staggered and located over supports.
   a. Install with 1/4" to 1/2" open space where panels abut other construction or structural penetrations.

2. Fastening Methods: Apply gypsum panels to supports with corrosion resistant drill screws.

3.4 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints at locations indicated on Drawings or according to ASTM C 840 and in specific locations approved by Architect for visual effect.

1. Field review proposed control joint locations with Architect prior to finishing gypsum board surfaces.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners**,** unless otherwise indicated.
2. L-Bead: Use where indicated.
3. U-Bead: Use at exposed penal edges.

3.5 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints**,** rounded or beveled edges**,** and damaged surface areas.

C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

D. Gypsum Board Finish Levels: Finish panels according to ASTM C 840:

1. Finish all panel surfaces which will be exposed to view, concealed behind partition mounted casework, equipment, and devices, and located above acoustical ceiling system.
   a. Primer and its application to surfaces are specified in other Division 09 Sections.

3.6 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 093000 - TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Ceramic tile.
2. Metal transitions.
3. Metal edge strips.

B. Related Sections:

1. Division 07 Section "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.

1.3 DEFINITIONS

A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in "American National Standard Specifications for Installation of Ceramic Tile."

C. Module Size: Actual tile size plus joint width indicated.

D. Face Size: Actual tile size, excluding spacer lugs.

1.4 PERFORMANCE REQUIREMENTS

A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:

1. Level Surfaces: Minimum: Non-Abrasive: 0.50–0.59; Abrasive: Less Than 0.60.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

C. Samples for Verification:

1. Full-size units of each type and composition of tile and for each color and finish required.
2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least 12 inches square, but not fewer than 4 tiles. Use grout of type and in color or colors approved for completed Work.
3. Full-size units of each type of trim and accessory.
4. Stone thresholds in 6-inch lengths.
5. Metal edge strips in 6-inch lengths.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Product Certificates: For each type of product, signed by product manufacturer.

C. Material Test Reports: For each tile-setting and -grouting product.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units not less than 3 percent of amount installed for each type, composition, color, pattern, and size indicated.

2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.8 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain tile of each type and color or finish from one source or producer.

1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:

1. Metal edge strips.
2. Metal transitions / protection edges.

D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of each type of floor tile installation.
2. Build mockup of each type of wall tile installation.

E. Pre-installation Conference: Conduct conference at Project site.

1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

D. Store liquid materials in unopened containers and protected from freezing.

E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.10 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements unless otherwise indicated.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCA installation methods specified in tile installation schedules, and other requirements specified.

C. FloorScore Compliance: Tile for floors shall comply with requirements of FloorScore Standard.

D. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

E. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

1. Where tile is indicated for installation, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

F. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by pre-coating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

2.2 TILE PRODUCTS

A. Tile Type CT1: Factory-mounted unglazed ceramic mosaic tile.
1. Basis-of-Design Product (Floor Tile): Subject to compliance with requirements, provide one of the following products (at Architect’s option):
   a. American Olean, Unglazed Colorbody Porcelain Mosaics (Groups 1 and 2).
   b. Daltile Keystones Colorbody Porcelain (Groups 1and 2).

2. Basis-of-Design Product (Wall Tile): Subject to compliance with requirements, provide one of the following products (at Architect’s option):
   a. American Olean, Semi-Gloss Bright and Matte (Groups 2, 3, 4 and 5).
   b. Daltile Semi-Gloss / Matte (Groups 2, 3, and 4).

3. Composition: Porcelain.
4. Module Size (Floor): 2 by 2 inches.
5. Module Size (Wall): 4-1/4 by 4-1/4 inches.
6. Thickness: 5/16 inch.
7. Face: Plain, with cushion edges.
8. Surface: Smooth, without and Slip-resistant, with abrasive admixture.
9. Finish: Mat, opaque glaze.
10. Tile Color and Pattern: As selected by Architect from manufacturer's full range.
11. Grout Color: As selected by Architect from manufacturer's full range.
12. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

    a. Base Cove: Cove, module size 2 by 2 inch.
    b. Base Cap for Portland Cement Mortar Installations: Bead (bullnose), module size 2 by 2 inches.
    c. Base Cap for Thin-Set Mortar Installations: Surface bullnose, module size 2 by 2 inches.
    d. Wainscot Cap for Portland Cement Mortar Installations: Bead (bullnose), module size 4 by 4 inch.
    e. Wainscot Cap for Thin-Set Mortar Installations: Surface bullnose, module size 4 by 4 inches.
    f. Wainscot Cap for Flush Conditions: Regular flat tile for conditions where tile wainscot is shown flush with wall surface above it, same size as adjoining flat tile.
    g. External Corners for Portland Cement Mortar Installations: Metal edge strip.

h. External Corners for Thin-Set Mortar Installations: .
i. Internal Corners (Base): Cove base and cap, use angle pieces designed to fit with stretcher shapes.
j. Internal Corners (Wall): Field-butted square corners.

2.3 SETTING MATERIALS

A. Dry-Set Portland Cement Mortar (Thin Set): ANSI A118.1.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Bostik, Inc.
   b. MAPEI Corporation.
   c. Summitville Tiles, Inc.

2. For wall applications, provide mortar that complies with requirements for non-sagging mortar in addition to the other requirements in ANSI A118.1.

B. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Bostik, Inc.
   b. MAPEI Corporation.
   c. Summitville Tiles, Inc.

2. Provide prepackaged, dry-mortar mix containing dry, re-dispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
3. Provide prepackaged, dry-mortar mix combined with acrylic resin-liquid-latex additive at Project site.
4. For wall applications, provide mortar that complies with requirements for non-sagging mortar in addition to the other requirements in ANSI A118.4.

C. Medium-Bed, Latex-Portland Cement Mortar: Comply with requirements in ANSI A118.4. Provide product that is approved by manufacturer for application thickness of 5/8 inch.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Bostik, Inc.
   b. MAPEI Corporation.
   c. Summitville Tiles, Inc.

2. Provide prepackaged, dry-mortar mix containing dry, re-dispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
3. Provide prepackaged, dry-mortar mix combined with acrylic resin liquid-latex additive at Project site.

2.4 GROUT MATERIALS

A. Standard Cement Grout: ANSI A118.6.

1. Manufacturers: Subject to compliance with requirements (and Architect's final approval), provide products by one of the following manufacturers:

a. Bostik, Inc.
b. MAPEI Corporation.
c. Summitville Tiles, Inc.

2.5 ELASTOMERIC SEALANTS

A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Division 07 Section "Joint Sealants."
1. Use primers, backer rods, and sealant accessories recommended by sealant manufacturer.

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.

C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.

1. Products: Subject to compliance with requirements, provide one of the following:
a. Dow Corning Corporation; Dow Corning 786.
b. GE Silicones; a division of GE Specialty Materials; Sanitary 1700.
c. Tremco Incorporated; Tremsil 600 White.

2.6 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Metal Edge Strips: Outside corner and edge angle or L-shape, height to match tile and setting-bed thickness, metallic, designed specifically for flooring applications; stainless-steel, ASTM A 666, 300 Series exposed-edge material.

1. Outside Corner (all outside corners): Schluter Systems "ECK-E".
2. Trim: Schluter Systems "Sciene" Edge Trim.
3. Tile Edge Threshold (all dissimilar flooring junctures): Schluter Systems "RENO-U".

C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

D. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints and that does not change color or appearance of grout.

1. Products: Subject to compliance with requirements, available products that may be incorporated

into the Work include, but are not limited to, the following:

a. Bostik, Inc.; CeramaSeal Grout & Tile Sealer.
b. MAPEI Corporation; KER 004, Keraseal Penetrating Sealer for Unglazed Grout and Tile.
c. Summitville Tiles, Inc.; SL-15, Invisible Seal Penetrating Grout and Tile Sealer.

2.7 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
2. Verify that concrete substrates for tile floors installed comply with surface finish requirements in ANSI A108.01 for installations indicated.

    a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
    b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.

3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

B. Existing CMU partition flatness to be verified prior to application of new tile. Grind CMU and mortar surfaces, corners, and edges and/or skim coat surface of CMU partitions as required to provide smooth surface for new tile.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives or thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.

C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

D. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, pre-coat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 TILE INSTALLATION

A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

F. Joint Widths: Unless otherwise indicated, install tile with the joint widths recommended by the manufacturer.

G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated and/or spaced as recommended/required for existing conditions and configuration of tile applications. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

I. Thresholds: Metal in same type of setting bed as floor, unless otherwise indicated.

1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-portland cement mortar (thin set).
2. Do not extend crack isolation membrane under thresholds set in dry-set portland cement or latex-portland cement mortar. Fill joints between such thresholds and adjoining tile set on crack isolation membrane with elastomeric sealant.

J. Metal Edge Strips: Install at locations indicated or specified.

K. Grout Sealer: Apply grout sealer to cementitious grout joints in tile walls and floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

1. Provide two (2) coat application of grout sealer.

3.4 CRACK ISOLATION MEMBRANE INSTALLATION

A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness and bonded securely to substrate.

B. Do not install tile or setting materials over crack isolation membrane until membrane has cured.

3.5 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.

B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.6 INTERIOR TILE INSTALLATION SCHEDULE

A. Interior Floor Installations, Concrete Subfloor:

1. Tile Installation F113: Thin-set mortar; TCA F113.

a. Tile Type: CT1.
b. Thin-Set Mortar: Dry-set Latex- Medium-bed, latex- portland cement mortar.
c. Grout: Polymer-modified sanded Polymer-modified unsanded grout.

B. Interior Wall Installations, Masonry or Concrete:

1. Tile Installation W202: Thin-set mortar; TCA W202.

a. Tile Type: CT1.

END OF SECTION 093000

SECTION 093013 – QUARRY TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Quarry tile.
2. Sealant, for all junctures with pre-manufactured kitchen equipment wall panels.

1.3 SCOPE OF WORK

A. Scope of Work

1. Selectively remove existing damaged quarry tile flooring (tile and grout) and preparation of existing substrate surfaces.
2. Refer to Contract Drawings for extent of quarry tile removal and replacement.
3. Furnish and install new infill replacement quarry tile flooring in location where existing quarry tile was selectively removed.
4. Provide grout joint cleaning of entire existing quarry tile flooring. (Area E10)
5. Apply sealant (two coats) to new and existing quarry tile flooring joints. (Area E10)
6. Remove and replace all existing joint sealant at juncture of quarry tile and floor mounted kitchen equipment.
7. Allow the tile and grout to set in accordance with the manufacturer’s recommendation prior to exposure to traffic or water/moisture.

1.4 DEFINITIONS

A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

B. ANSI A108 Series, which are contained in its "Specifications for Installation of Ceramic Tile."

C. Module Size: Actual tile size plus joint width indicated.

D. Face Size: Actual tile size, excluding spacer lugs.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

C. Samples for Verification:

1. Full-size units of each type of tile and for each color and finish required.
2. Grout color samples.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.7 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer Qualifications: Company specializing in performing the work of this section with a minimum five (5) years' experience.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

D. Store liquid materials in unopened containers and protected from freezing.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Tile: Obtain tile of each type and color or finish from single source or producer.

1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.

1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.
2. Obtain waterproof membrane, except for sheet products, from manufacturer of setting and grouting materials.

2.2 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

2.3 TILE PRODUCTS

A. Quarry Tile (QT1)

1. Manufacturers: Subject to compliance with requirements, provide products by the following manufacturer:
   a. American Olean Corporation
2. Basis-of-Design Product: Subject to compliance with requirements, provide the following products for Base Bid replacement tile:
   a. Unglazed Quarry Naturals, as manufactured by American Olean Corporation.
3. Size: 6 inch by 6 inch.
4. Thickness: 1/2 inch.
5. Finish: Solid to match existing.
6. Surface (CT-1): Standard to match existing.
7. Tile Color: Match existing.
8. Grout Color: Match existing.
9. Provide shapes and profiles to match existing, selected from manufacturer’s standard special shapes:

2.4 SETTING MATERIALS

A. Modified Dry-Set Mortar (Thinset): ANSI A118.4.

1. Manufacturers: Subject to compliance with requirements and Architect's approval, provide products by the following:
   a. Bostik, Inc.
   b. Laticrete
   c. MAPEI Corporation.

2. Basis-of-Design Product: Subject to compliance with requirements and Architect's approval, provide the following Basis of Design product indicated, or comparable product by one of the acceptable manufacturers:
   a. Ultra Flex 2, as manufactured by MAPEI.

3. Provide pre-packaged, dry-mortar mix containing, re-dispersible, single-component, high-performance, dry polymer-modified additive to which only water must be added at Project site.

4. For wall applications, provide mortar that complies with requirements for non-sagging mortar in addition to the other requirements in ANSI A118.4.

2.5 GROUT MATERIALS

A. High-Performance Tile Grout: ANSI A118.7.

1. Manufacturers: Subject to compliance with requirements and Architect's approval, provide products by the following:
   a. Bostik, Inc.
   b. Laticrete
   c. MAPEI Corporation.

2. Basis-of-Design Product: Subject to compliance with requirements and Architect's approval, provide the following Basis of Design product indicated, or comparable product by one of the acceptable manufacturers:
   a. Kerapoxy IEG, as manufactured by MAPEI Corporation.

3. Provide prepackaged, dry-grout mix containing, two-component, dry epoxy modified additive to which only water must be added at Project site.

2.6 MISCELLANEOUS MATERIALS

A. Joint Sealant: Silicone (100%) sealant appropriate for wet and dry installation, heavy traffic and expansion/movement joints.

1. Manufacturer / Product: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Mapesil, as manufactured by MAPEI Corporation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
2. Verify and confirm that new and existing concrete levelness and/or sloped properly to drains.
3. Verify and confirm that mounting elevations of all floor mounted drains and equipment is appropriate for tile installation.
4. Verify that concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
    a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
    b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
5. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
6. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

3.3 TILE INSTALLATION

A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:

B. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

C. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

D. Jointing Pattern: Lay tile in grid pattern to match existing.

E. Joint Widths: Unless otherwise indicated, or required to match existing adjacent, install tile with the following joint widths:

1. Quarry Tile: 3/8 inch, align with existing.

3.4 ADJUSTING AND CLEANING

A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.

B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.5 PROTECTION

A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

END OF SECTION 093013

SECTION 095110 - ACOUSTICAL LAY-IN CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exposed suspension system.
2. Trim and accessories.
3. Acoustical lay-in panels.

B. Related Documents:

1. Room Finish Schedule indicated on the Drawings

1.2 SCOPE OF WORK

A. The scope of acoustical lay-in ceiling installation generally includes the following:

1. Complete removal and replacement of existing ceiling tile and ceiling suspension system.
2. Installation of new and existing ceiling tile mounted devices.

1.3 REFERENCES

A. ASTM A 641-92 -- Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 1992.

B. ASTM C 635-94 -- Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 1994.

C. ASTM C 636-96 -- Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels; 1996.

D. ASTM E 84-98 -- Standard Test Method for Surface Burning Characteristics of Building Materials; 1998.

E. ASTM E 1264-96 -- Standard Classification for Acoustical Ceiling Products; 1996.

1.4 SUBMITTALS

A. Product Data: Submit data for each distinct suspension system and acoustical unit type indicated.

B. Samples: Submit the following for any replacement products:

1. Verification samples:

a. Acoustical units: 12-inch-square sample for each type of replacement products for Architect review to confirm compliance and match with existing to remain products.
b. Exposed suspension and trim elements: 12-inch-long samples of each type and finish to confirm compliance and match with existing to remain products..

1.5 QUALITY ASSURANCE

A. Fire Performance Characteristics:

1. Surface burning characteristics: Provide products having the following characteristics when tested in accordance with ASTM E 84:
a. Maximum flame spread: 25.
b. Maximum smoke developed: 50.

1.6 PROJECT CONDITIONS

A. Coordination Data: Prepare and distribute to affected installers, data necessary for coordination with related work. Include setting diagrams showing placement of attachment devices for acoustical ceiling hangers.

B. Within each space to receive specified products, do not begin installation until the following conditions are met:

1. Work above ceilings has been finished, tested, and approved.
2. Space to receive ceiling system is properly enclosed and protected from weather.
3. Any wet work within the space is dry.

C. Do not begin installation of ceiling system until building's normal operating temperature and humidity levels have been reached and will be maintained.

PART 2 - PRODUCTS

2.1 ACOUSTICAL CEILING UNITS - GENERAL

A. Standard for Acoustical Ceiling Units: Provide units conforming to applicable requirements of ASTM E 1264 for Class A materials.

B. Provide ceiling tile by manufacturer and in manufacturer’s product line to match existing ceiling tile.

2.2 CEILING SUSPENSION SYSTEMS - GENERAL

A. General Requirements: Provide suspension systems conforming to specified requirements and to requirements of ASTM C 635.

B. Colors: White.

C. Finishes: Manufacturer's standard shop-applied finishes to match existing.

D. Attachment Devices for Suspension System:

1. Anchors and intermediate support members: Provide sizes capable of sustaining 5 times the load-carrying capabilities shown in ASTM C 635, Table 1, "Direct Hung" column.
2. Hanger wire: Zinc-coated (galvanized) carbon steel wire, ASTM A 641, soft temper, with Class 1 coating, minimum 12 gage (0.106 inch diameter).

E. Manufacturer: Provide products complying with requirements of the contract documents and made by one of the following:

1. Exposed steel suspension system:
   a. Armstrong World Industries, Inc.
   b. Chicago Metallic Corporation.
   c. USG Corporation.
   d. Celotex Corp.

2.3 LAY-IN ACOUSTICAL CEILING SYSTEM (ACT1)

A. Scope of Work: For installation in all areas, unless noted otherwise.

B. Acoustical Panels (ACT1): Basis of Design: Armstrong, Cortega 704.

1. Size: 24 by 24 inches.
2. Thickness: 5/8".
3. Edge profile: Angled Tegular.
4. Finished Surface Color: White.

C. Exposed Grid: Formed steel with painted finish

1. Profile: Single-web tee, 15/16 inch wide.
2. Structural classification (ASTM C 635): Intermediate-Duty System.
3. Color and texture: White, standard smooth texture.

D. Approved Manufacturers:

1. Armstrong World Industries, Inc.

2.3 LAY-IN ACOUSTICAL CEILING SYSTEM (ACT2)

A. Scope of Work: For installation in all E10 (KITCHEN).

B. Acoustical Panels (ACT2): Basis of Design: USG, Sheetrock ClimaPlus.

1. Size: 24 by 48 inches.
2. Thickness: 1/2".
3. Core Composition: Gypsum Board.

4. Finished Surfaces (Face): Vinyl Laminated Face
5. Edge profile: Square.
6. Finished Surface Color: White.

C. Exposed Grid: Formed steel with painted finish.

1. Profile: Single-web tee, 15/16 inch wide.
2. Structural classification (ASTM C 635): Intermediate-Duty System.
3. Color and texture: White color to match ceiling panels; standard smooth texture.

D. Approved Manufacturers:

1. USG Interiors, Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which products of this section are to be installed and verify that the work properly may commence.

3.2 PREPARATION

A. Layout: Conform to reflected ceiling plans to greatest extent possible.

3.3 SUSPENSION SYSTEM INSTALLATION

A. New acoustical ceiling suspension systems to be installed at similar elevation as demolished ceiling system (approximately 9'-2") and/or at elevation required to conceal unpainted partition surfaces and/or existing edge trim fastener holes

1. Field verify levelness (and low point) of removed ceiling system prior to establishing elevation of new ceiling suspension system.

B. Suspension system layout to be coordinated with existing to remain sprinkler heads to avoid conflict and sprinkler head relocation. Sprinkler heads will not be centered in ceiling tiles in areas where a 2'-0" x 4'-0" acoustical ceiling tile system was removed.

C. General:

1. Conform to the requirements of ASTM C 636, manufacturer's installation instructions, and governing regulations.
2. Install hangers plumb and supported solely by building structure or carrying channels. Do not allow hangers to contact any objects or materials in ceiling plenum which are not actual components of ceiling system.
   a. Splay hangers only where necessary to avoid obstacles. Provide counter-splaying, bracing, or other acceptable devices to compensate for lateral stresses caused by splayed hangers.
   b. Do not attach hangers to piping, conduit, or duct. Provide carrying

channel trapeze support where obstruction cannot be avoided by splaying hanger 45 degrees from vertical or less.

3. Space hangers at not more than 48 inches on center and within 6 inches of ends of each direct-hung runner or carrying channel, unless indicated otherwise.
4. Loop and tie wire hangers securely to building's structural members; to attachment devices indicated; or, where not indicated, to devices suitable for substrate and capable of permanently supporting ceiling weight without failure or deterioration.
5. Level ceiling suspension system to tolerance of 1/8 inch in 12 feet, with cumulative tolerance not to exceed 1/4 inch. Bending or kinking of hangers is not allowed.

D. Exposed (Lay-in) Grid Installation: Install grid members square, with ends of members securely interlocked. Remove and replace dented, bent, or kinked members.

3.4 TRIM INSTALLATION

A. Install edge moldings and trim units at acoustical ceiling borders, at locations indicated, and where required to cover acoustical unit edges.

1. Molding and trim attachment: Space screws not more than 16 inches on center and within 3 inches of ends of each trim-piece being installed. Install moldings and trim level with suspension system and within tolerance specified for suspension system.
2. Miter corners and align butt joints carefully to form tight hairline joints.
3. Face-riveting of trim and moldings is not allowed.

3.5 LAY-IN PANEL INSTALLATION

A. Panel Installation: Install acoustical panels for accurate fit with suspension system and trim members. Scribe and cut panels at ceiling perimeter and at obstructions to provide neat, precise fit.

1. Square-edge panel installation: Provide installation with panel edges which are hidden from view, by suspension members or trim.

3.6 ADJUST AND CLEAN

A. Use ceiling manufacturer's recommended methods and materials to clean and touch-up exposed components of ceiling system.

B. Replace ceiling system components which are discolored or damaged in any way, in a manner which results in the ceiling system showing no evidence of replacement work.

C. Repair and repaint any masonry units damaged during the securement of the trim to the partitions.

3.7 ATTIC STOCK

A. Provide four (4) unopened cartons of ACT1 for Owner's use to be furnished at Substantial Completion.
B. Provide one (1) unopened carton of ACT2 for Owner's use to be furnished at Substantial Completion.

END OF SECTION 095110

SECTION 096500 - RESILIENT SHEET FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A, Section Includes:
1. Resilient sheet flooring and base.
2. Resilient sheet accessories.

1.2 SCOPE OF WORK

A. The scope of work including providing and installing resilient sheet flooring and base and accessories.
B. Furnish and install continuous horizontal stainless steel base top and end termination cap.
C. Furnish and install continuous radius cove base corner.

1.3 SUBMITTALS

A. Product Data: Submit technical data from each manufacturer of resilient products required.

B. Initial Samples: Submit manufacturer's standard color selection samples for resilient products required, including all available colors and patterns.

C. Maintenance Procedures: Submit manufacturer's published instructions for care and cleaning of resilient flooring products specified.

1.4 QUALITY ASSURANCE

A. Manufacturer: For each type of product required, including adhesives, cleaning compounds, and other accessories, provide the same product by one manufacturer throughout the project.

B. Installer: Manufacturer-certified for acceptable performance in installation of vinyl flooring with heat-welded seams.

C. Warrantee (Product): Provide five (5) year Manufacturer Product Warrantee, from date of Substantial Completion.

D. Warrantee (Installer): Provide two (2) year Contractor Installation Warrantee, from date of Substantial Completion.

1.5 PROJECT CONDITIONS

A. Environmental Requirements: At least 48 hours prior to beginning work, move resilient flooring materials to areas of installation and maintain at minimum 70 degrees F until 48

hours after completing installation and at minimum 55 degrees F thereafter.

B. Sequencing: Do not begin installation of resilient flooring products until painting has been completed for each area.

C. Existing Conditions: Do not install resilient flooring on concrete substrates until testing has been conducted to assure that moisture levels are acceptable.

PART 2 - PRODUCTS

2.1 SHEET FLOORING MATERIALS

A. Resilient Sheet Flooring (RS1):
1. Acceptable manufacturers and products:
   a. Tarkett iQ Optima.
2. Roll width: 78 inches.
3. Thickness: .080 inch.
4. Heat-welded seams.
5. Submit manufacturer product and color samples. Architect will select color and from manufacturer's complete line of standard colors.
6. Accessories: Provide the following:
   a. Preformed metal radius base corners.
   b. Termination cap edge trim, and metal inside and outside corners.

2.2 SHEET FLOORING WELDING MATERIALS

B. Welding Bead: Solid vinyl strand produced by manufacturer of homogeneous vinyl flooring for heat-welding seams.

1. Color: Match field color of sheet flooring.

2.3 MISCELLANEOUS ACCESSORIES

A. Adhesive: Type recommended by manufacturer of resilient product for specific substrate conditions.

B. Primer: Type recommended by manufacturer of resilient product for application to concrete substrates.

C. Patching/Leveling Compound: Ardex Self-Leveling Latex and patching compound appropriate for application and acceptable to manufacturer of resilient flooring product.

D. Sealers or Polishes: Types recommended by flooring manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. General: Inspect substrates and conditions of installation to verify that work may properly commence. Do not proceed with the work until unsatisfactory conditions have been corrected.

B. Floor Preparation: Provide all floor preparation necessary, including all concrete leveling, grinding and patching, to provide a level and smooth substrate appropriate for flooring installation.

B. Concrete Substrates: Perform manufacturer's recommended moisture tests before beginning installation, to verify that concrete surfaces have cured sufficiently to allow adhesive bond to resilient flooring.

1. Remove substrate coatings and other substances that are incompatible with adhesives.
2. Perform moisture testing recommended by manufacturer.

3.2 PREPARATION

A. Substrates: Fill minor depressions, cracks, and other irregularities with patching compound.

1. Remove paint, curing compounds, and other materials that could interfere with adhesion of resilient products.
2. Remove all loose of irregular patching compound.
3. Rework, grind, patch and/or level existing substrate surrounding the floor drains to provide smooth transition and drainage.
4. Sweep or vacuum clean substrate immediately prior to beginning installation in each area.
5. Apply primer to concrete substrates prior to application of adhesive, following manufacturer's printed instructions.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Comply with manufacturer's published recommendations for installation in each area, extending resilient flooring into spaces which are partially concealed. Cut and fit tightly to fixtures, pipes, and other obstructions, as well as to walls and partitions.

B. Tightly adhere resilient flooring to substrate with no open joints or cracks, and without raised or blistered areas. Spread adhesive evenly, so that final installation will be without telegraphed markings from adhesive or substrate.

3.4 RESILIENT SHEET FLOORING INSTALLATION

A. Layout and Matching: Establish optimum use of material with minimum number of seams in each space. Match patterns carefully at seams, following manufacturer's directions.

B. Flooring: Follow manufacturer's directions for application of adhesive, using full spread method unless perimeter bonding technique is specifically recommended by

manufacturer for substrate condition. Apply recommended adhesive or sealant at seams, and roll in accordance with manufacturer's recommendations to achieve flat, blister-free installation.

C. Welding: If seams have not been pre-grooved by manufacturer, prepare seams with special routing tool and heat weld with vinyl welding bead, following manufacturer's recommendations to achieve flat, seamless installation.

3.5 INSTALLATION OF MISCELLANEOUS ACCESSORIES

A. Pre-manufactured Accessories: At all locations provide and install preformed metal edges and preformed base corners for resilient flooring. Install resilient flooring accessories securely with recommended adhesive, to achieve secure and tightly butted joint.

3.6 CLEANING

A. Initial Cleaning: Remove excess and waste materials promptly, and sweep or vacuum clean resilient flooring as soon as installation has been completed in each area. After adhesive has had adequate time to set, mop each area with damp mop and mild detergent.

B. Final Cleaning: Remove scuff marks, excess adhesive, and other foreign substances, using only cleaning products and techniques recommended by manufacturer of resilient products.

3.7 PROTECTION

A. Construction Period: Cover traffic routes across completed resilient flooring with plywood, hardboard, or other durable material to protect against damage from loaded dollies and other construction traffic.

1. Polish: Apply protective polish to clean resilient flooring surfaces, unless manufacturer of resilient product recommends otherwise.

B. Final Protection: Cover resilient floor surface with non-staining building paper until substantial completion in each area.

END OF SECTION 096500

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Resilient floor base molding and accessories.

1.3 SCOPE OF WORK

A. The Scope of Work to be provided related to this specification system includes, but is not limited to, the following:

1. Remove all existing resilient floor base mounted on existing partitions and casework, and other surfaces in all building areas. (Three Oaks School)
2. Selectively remove all existing resilient floor base mounted on existing partitions, casework, and other surfaces in areas affected by demolition and new construction activities. (Deer Path School)
3. Completely remove all existing floor base adhesive.
4. Furnish and install new resilient floor base on new and existing partitions and new casework.
5. Furnish and install new resilient floor base on all surfaces where existing resilient floor base was previously removed.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of product indicated.

C. Samples for Verification: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.

D. Product Schedule: For resilient products**,** provide room finish schedule and finish floor plan indicating the location, type and color of all products to be installed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 degrees F or more than 90 degrees F.

1.6 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 60 degrees F or more than 80 degrees F, in spaces to receive resilient products during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 degrees F or more than 95 degrees F**.**

C. Install resilient products after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS

1. Provide one (1) unopened box of each base color.

PART 2 - PRODUCTS

2.1 RESILIENT BASE (RB1, RB2 and RB3)

A. Resilient Base:

1. Manufacturers: Subject to compliance with requirements, provide products by the following to match existing to remain:
   a. Tarkett Duracove Rubber Wall Base
   b. Provide standard rubber floor base samples for all specified manufacturers, which comply with requirements for Architect’s selection to match existing to remain rubber base.

B. Resilient Base Standard: ASTM F 1861.

1. Material Requirement: Type TS (rubber, vulcanized thermoset).
2. Manufacturing Method: Group I solid, homogeneous.
3. Style: Cove (RB1) base with toe for LVT flooring or Straight (RB2) flat or toeless base for Carpet Tile flooring areas.

C. Minimum Thickness: 0.125 inch.

D. Height (RB1 and RB2): 4-inch for all new base, unless noted otherwise.

E. Height (RB3): 6-inch (Gymnasium Athletic Flooring).

F. Lengths: Coils in manufacturer's standard length.

1. Manufacturer’s standard 48 inch long for miscellaneous base replacement.

G. Outside Corners: Manufacturer’s standard outside corner.

H. Inside Corners: Field cut inside corners.

I. Finish: Matte.

J. Colors and Patterns: As selected by Architect to match existing.

2.2 INSTALLATION MATERIALS

A. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates meet manufacturer’s maximum moisture-vapor-emission rate.
b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates meet manufacturer’s maximum relative humidity level measurement.

B. Do not install resilient products until they are same temperature as the space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

H. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends.
2. Inside Corners: Use straight pieces of maximum lengths possible.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

B. Perform the following operations immediately after completing resilient product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

END OF SECTION 096513

SECTION 096519 - VINYL TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Luxury vinyl floor tile (LVT1)

B. Related Sections:

1. Division 01 Section “Summary” for additional scope of work descriptions.
2. Division 09 Section "Resilient Base and Accessories" for resilient base, reducer strips, and other accessories installed with resilient floor coverings.

1.3 SCOPE OF WORK

A. The Scope of Work to be provided related to this specification system includes, but is not limited to, the following:

1. Complete removal of existing flooring and all associated adhesives and accessories.
2. Selective removal of existing Luxury Vinyl Tile (LVT) flooring affected by interior renovations, the replacement of existing interior and exterior doors and frames, and casework. (Three Oaks School)
3. Completely remove all existing flooring adhesive where existing LVT flooring is selectively removed.
4. Provide all floor preparation necessary for the installation of replacement LVT flooring.
5. Furnish and install new LVT flooring.
    a. Three Oaks School: New LVT flooring furnished by Owner from existing attic stock.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Qualification Data: For qualified Installer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.6 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 60 deg F or more than 85 deg F, in spaces to receive floor tile during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 60 deg F or more than 85 deg F.

C. Close spaces to traffic during floor tile installation.

D. Close spaces to traffic for 48 hours after floor tile installation.

1.7 WARRANTEE

A. Installation Warranty for Floor Tile: Installer shall warrantee the installation and agrees to repair or replace components that fail as a result of the installation within specified warranty period.

1. Warranty does not include deterioration or failure due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to, movement and delamination from the substrate.
3. Luxury Tile Product Warrantee Period: Ten (10) years from date of Substantial Completion.
4. Installer Warrantee: Two (2) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 LUXURY VINYL FLOOR TILE (LVT1)

A. Products: Subject to compliance with requirements, provide one or both of the following tile flooring products (at Owner's option):

1. Tarkett Contour Series Abstract
   a. "Color Beam" and "Color Pop".

B. Tile Standard: ASTM F 1700, Solid Vinyl Floor Tile.

C. Thickness: 0.118 inch (3mm).

D. Size: 6 by 36 inches, and 18 by 18 inches.

E. Colors and Patterns: Match existing tile to be replaced.

2.2 INSTALLATION MATERIALS

A. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

C. Do not install floor tiles until they are same temperature as space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

D. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern) and/or in pattern of colors and sizes indicated.

C. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

D. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

E. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.

B. Perform the following operations immediately after completing floor tile installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect floor tile products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

3.5 ATTIC STOCK

A. Provide minimum of six (6) unopened boxes of each type and color of flooring tile.

END OF SECTION 096519

SECTION 096566 - RESILIENT ATHLETIC FLOORING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Existing flooring demolition.

B. Existing concrete floor slab preparation.

C. New resilient athletic flooring system installation.

1.2 SUMMARY

A. Section Includes: Sheet resilient athletic flooring.

1.3 SCOPE OF WORK

A. All work associated with the removal of existing sheet flooring and the installation of new resilient athletic flooring.

B. Selective Demolition

1. Removal of existing sheet flooring and all associated flooring adhesive.
2. Removal of existing sheet flooring base and all associated adhesive.
3. Removal of existing door thresholds.

C. Preparation

1. Perform all specified and manufacturers recommend existing conditions verification, investigation and material testing.
2. Perform moisture test of existing concrete floor slab.
3. Prepare existing concrete floor slab for application of new flooring system, including but not limited to, sanding, removal of all foreign materials and/or contamination, patch and repair all cracks, voids or imperfections.
4. Application of skim coat/leveling coat of cement-based leveling material.

D. Installation

1. Furnish and install new resilient athletic flooring.
2. Installation of new 6-inch resilient floor base (RB3).
3. Application of game lines, text and graphics.
    a. Main Basketball Court.
    b. Half-Court Basketball Courts (4).
    c. Volleyball Court.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Manufacturer Certifications:

1. Provide certification that accurately identifies the Original Equipment Manufacturer (OEM) of flooring furnished for this project including manufacturer's name, address and factory location.
2. Provide ISO 9001 certification for the OEM of the specified products.
3. Provide ISO 14001 certification for the OEM of the specified products.

C. Laboratory Test Results:

1. Provide certification of testing per ASTM F2772-11 and the product being furnished complies with the ASTM Indoor Sport Floor Classification specified for this project. Third-party certification required; sales literature is not sufficient.

D. Shop Drawings: Showing installation details and locations of borders, patterns, game lines, locations of floor inserts and seams.

E. Samples:

1. Initial Samples: Manufacturer's color chart for selection of available floors.
2. Samples for Verification: Provide 24-inches by 24 inches samples of wood and/or solid color selections to show the visual appearance review and final selection.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data:

1. Manufacturer Qualifications: Confirm the product manufacturer is qualified athletic flooring Manufacturer.
2. Installer Qualifications: Confirm the installer qualified resilient athletic flooring Installer.

1.6 CLOSEOUT SUBMITTALS

A. Submit three (3) hardcopies and one (1) electronic copy (PDF) copy of the following:

1. Manufacturer maintenance instructions.
2. Manufacturer material warranty.
3. Installer installation warranty.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. ISO 9001 Certified.

2. ISO 14001 Certified.
3. At least ten (10) years active experience in the manufacture and marketing of indoor resilient athletic flooring.

B. Installer Qualifications:

1. At least five (5) years' experience in the installation of resilient athletic flooring.
2. Experience on at least ten (10) projects of similar size, type (manufacturer and flooring product) and complexity as this project.
3. Manufacturer approved distributor /installer of the resilient athletic flooring.
4. Employer of workers for this Project who are competent in techniques required by manufacturer for resilient athletic flooring installation indicated.

C. Fire Test Characteristics: As determined by testing identical products according to ASTM E 648, Class 1, by a qualified testing agency acceptable to authorities having jurisdiction.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store flooring and installation materials in protected dry spaces, with ambient temperatures maintained within range recommended by manufacturer, but not less than 55 deg F (13 deg C) nor more than 85 deg F (29 deg C).

B. Store the indoor resilient athletic surfacing rolls in an upright position on a smooth flat surface immediately upon delivery to Project.

1.9 FIELD CONDITIONS

A. Product Installation:

1. Maintain temperatures during installation within range recommended by manufacturer, but not less than 65 deg F (18 deg C) in spaces to receive flooring 48 hours prior, during and 48 hours after installation.
2. After installation, maintain temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).
3. Prohibit traffic during flooring installation and for at least 48 hours after flooring installation.

1.10 WARRANTY

A. Manufacturer Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace sports flooring that fails within specified warranty period.

1. Material warranty must be direct from the product manufacturer.
   a. Material warranties from separate or third party insurance providers are not valid.

2. Failures include, but are not limited to, the following:
   a. Material manufacturing defects.

b. Surface wear and deterioration to the point of wear-through.
c. Failure due to substrate moisture exposure not exceeding 90 percent relative humidity when tested according to ASTM F2170 or 8 pounds moisture vapor emission rate when tested according to ASTM F1869.

3. Warranty Period:
a. For material and manufacturing defects and surface wear-through: fifteen (15) years from date of Substantial Completion.
b. For moisture vapor tolerance: Five (5) years from date of Substantial Completion.

B. Manufacturer Certification: Standard written certification related to the resilient athletic flooring system installation.

1. Loading: The installation and the resilient athletic flooring surface shall accommodate occasional rolling cart load and static loads of folding tables and chairs without delamination, creep memory or surface failure.
2. Substrate: The existing concrete floor slab has been tested and satisfies all manufacturer requirements and standards for a fully-warranted installation.
3. Substrate: The new waterproofing/moisture barrier and cement-based substrate/leveling compound meets is compatible with the all new materials and products and meets or exceeds all of the manufacturer’s installation requirements and standards.

C. Installer Warranty: Installer's standard form in which installer agrees to repair or replace sports flooring that fails due to poor workmanship or faulty installation within the specified warranty period.

1. Warranty Period: Two (2) years from date of Substantial Completion.

D. Installer Certification: Standard written certification related to the resilient athletic flooring system installation.

1. Substrate: The existing concrete floor slab has been tested to the extent and in a manner which is in accordance with the manufacturer requirements.

1.11 COORDINATION

A. Coordinate layout and installation of flooring with other gymnasium equipment.

PART 2 - PRODUCTS

2.1 SHEET ATHLETIC FLOORING

A. Acceptable Product: Taraflex Sports Flooring, Multi-Use 6.2, installed with high-moisture tolerant full-spread adhesive.

B. Other Acceptable Manufacturers:

1. Submit formal written request for product name and model, including all technical specifications, finish selections, and product data necessary to confirm compliance with Basis-of-Design product standards.
2. Review and written approval by Architect of other manufacturer product(s). Architect's approval does not relieve Contractor of responsibility to provide products which comply with all requirements of this specification including full-spread adhesive installation.

C. Product Description:

1. Overall Thickness: Not less than 0.244 inches (6.2 mm).
2. Seaming Method: Heat welded.
3. Adhesive Method:
   a. Full-spread adhesive coverage to completely adhere flooring to substrate.
   b. Complete adhesive coverage to eliminate the possibility of gaps or space between the slab and flooring material where moisture could accumulate and create an environment conducive to mold growth.
   c. Flooring to be fully adhered to the concrete slab in all locations eliminating the possibility of waves or wrinkles forming caused by the floor shifting, moving or by rolling loads displacing it.
4. Bacteriostatic and Fungicidal Treatment: Manufacturer's factory-applied permanent treatment throughout the flooring material which can improve indoor air quality and reduce asthma and allergy risks associated with bacterial and mold growth.
   a. Product: Gerflor Sanosol
5. Applied Finish: Manufacturer's, factory-applied, permanent and UV-cured.
   a. No-Wax finish: Published product literature identifying factory applied finish as, "No-Wax-Just clean and rinse"
   b. Product: Gerflor Protecsol.
6. Field-Applied Finishes: None required and not allowed.
7. Roll Size:
   a. Roll Width: Rolls to be a minimum width of 59 inches (1.5 m) or 78" (2 mm) wide.
   b. Roll Length:
      1) Wood visual rolls to be a minimum length of 98 feet, 5 inches (30 m) to minimize the number of end-seams.
      2) Solid color rolls to be a minimum length of 98 feet, 5 inches (30 m) to minimize the amount of waste if accent colors are selected for boarders, keys or center circle.
8. Color and Pattern:
   a. As selected by Owner from manufacturer's standard colors and patterns.
   b. Wood pattern shall accurately simulate the true visual appearance of natural athletic wood strip flooring.
      1) Pattern shall replicate random-length stock by simulating non-uniform board lengths ranging from 18 inches to 48 inches with a maximum board width of 2-1/2 inches.
      2) Wood pattern shall not include a dark line simulating edges or ends of individual boards.
      3) Surface texture shall simulate realistic wood grain and not be raised or "pebbled" embossing.

D. Performance Criteria:

1. Meet or exceed the performance criteria of the Basis of Design product for the following criteria:
    a. Static Load Limit/Residual Indentation.
    b. Resistance to Rolling Load: EN 1569.
    c. Chemical Resistance: ASTM D 543.
    d. Impact Resistance: EN 1517.
    e. Abrasion Resistance: EN ISO 5470.
    f. Sound Insulation: EN ISO 717; 18 dB.
    g. Gloss/Brightness: EN ISO 2813.
    h. Organic Emission: ASTM D 5116.
    i. Fire Performance: ASTM E 648; Greater than 0.45 W/cm2, Class 1.
    j. Surface Maintenance Requirements: No-wax surface requiring only cleaning and rinsing.

2. Slab Moisture Design Tolerance:
    a. Maximum relative humidity of 90 percent when tested according to ASTM F 2170.
    b. Maximum moisture vapor emission rate of 8 pounds of water per 1000 sq. ft. in 24 hours when tested according to ASTM F1869.

2.2 ACCESSORIES

A. Resilient Floor Base: Provide Johnsonite Resilient Base (RB1 or RB2), 6-inch height, Johnsonite, #960 Acrylic Cove Base Adhesive.

B. Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation approved by athletic flooring manufacturer.

C. Adhesives: Water-resistant type recommended by athletic flooring manufacturer for substrate and conditions indicated.
1. Product: Gerflor Gerfix Spray Adhesive.
2. Coverage Type: Full-spread application for 100% coverage.

D. Heat Welding Rod: As supplied by indoor resilient athletic flooring manufacturer. Color shall blend with resilient athletic flooring color.

E. Game-Line and Marker Paint: Complete system including primer, compatible with flooring and recommended by flooring and paint manufacturers.
1. Provide the number of line colors and configuration of game lines to match existing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify the Following:

1. The area in which the indoor resilient athletic flooring will be installed is dry, weather-tight and in compliance with specified requirements.
2. Permanent heat, lighting and ventilation systems are installed and operable.

3. Other work, including overhead work, that could cause damage, dirt, dust or otherwise interrupt installation has been completed or suspended.
4. No foreign materials or objects are present on the substrate and that it is clean and ready for preparation and installation.
5. Tests to verify that the moisture evaporative rate or substrate relative humidity is within the specified ranges.
6. The concrete slab surface pH level is within the specified range.
7. The concrete slab surface deviation is no greater than 3/16 inch within 10 feet (3.2 mm within 3 m) when measured according to ASTM E 1155.
8. The concrete slab complies with ACI 302.2R for concrete design including use of a low-permeance vapor barrier directly beneath the concrete subfloor with sealed penetrations.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written recommendations to ensure proper adhesion of resilient athletic flooring system.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of sealers, curing compounds and other additives. Remove coatings and other substances that are incompatible with adhesives using mechanical methods recommended by manufacturer.
2. Alkalinity Testing: Perform pH testing according to ASTM F 710. Proceed with installation only if pH readings are between 7.0 and 8.5.

C. Moisture Testing: Perform ASTM F 2170 relative humidity test and proceed with installation only after substrates have maximum relative humidity of 90 percent. Or perform ASTM F 1869 calcium chloride test and proceed with installation only after substrates have maximum moisture-vapor-emission rate of 8 lbs. of water/1000 sq. ft. in 24 hours.

D. Use trowelable concrete based leveling and patching compound with the same moisture vapor tolerance as the adhesive to fill depressions, holes, cracks, grooves or other irregularities in substrate.

E. Apply trowelable concrete based leveling and patching compound to fully coat entire surface of concrete slab to encapsulate all residual adhesive and ensure proper adhesion of resilient athletic flooring system.

F. Place flooring and installation materials into spaces where they will be installed at least 48 hours before installation. Install flooring materials only after they have reached the same temperature as space where they are to be installed.

G. Sand the surface of the concrete slab.

H. Sweep and then vacuum substrates immediately before installation. After cleaning, examine substrate for moisture, alkaline salts, grit, dust or other contamination. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 SHEET ATHLETIC FLOORING INSTALLATION

A. General:

1. Comply with resilient athletic flooring manufacturer's installation instructions.
2. Take necessary precautions to minimize noise, odors, dust and inconvenience during installation.
3. Fit flooring neatly and tightly to vertical surfaces, equipment anchors, floor outlets, and other interruptions of floor surface.
4. Extend flooring into toe spaces, door reveals, closets, and similar openings unless otherwise indicated.

B. Lay out flooring as follows:

1. Minimize number of seams and place them inconspicuous areas.
2. Locate seams as shown on approved Shop Drawings

C. Adhered Flooring: Attach products to substrates using a full-spread of adhesive applied to substrate to comply with adhesive and flooring manufacturer instructions.

D. Vinyl Sheet Flooring Seams: Finish seams to produce surfaces flush with adjoining flooring surfaces. Comply with ASTM F 1516. Rout joints and use heat welding rod to permanently and seamlessly fuse sections together.

3.4 GAME LINES AND GRAPHICS

A. Lay out game lines, text and numbering and event lines in accordance with the Contract Drawings.

1. Provide the number of game line colors to match existing.
2. Provide the quantity and configuration of game / event lines to match existing.
3. Provide quantity and configuration of text numbers to match existing.

B. Lay out game lines and text to comply with rules and diagrams published by National Federation of State High School Association for the sports activities indicated, or standards selected by the Owner and Architect.

C. Mask flooring at game lines and logos, and apply paint of color indicated to produce clean, sharp and distinct edges.

3.5 CLEANING AND PROTECTION

A. Perform the following operations after completing resilient athletic flooring installation:

1. Remove marks and blemishes from flooring surfaces.
2. Sweep and then vacuum flooring.
3. Damp-mop flooring to remove soiling.

B. Protect flooring from abrasions, indentations, and other damage from subsequent operations and placement of equipment, during remainder of construction period.

END OF SECTION

SECTION 096813 - TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes modular, tufted carpet tile.

B. Related Sections include the following:

1. Division 01 Section “Summary” for additional scope of work descriptions.
2. Division 09 Section "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

1.3 SCOPE OF WORK

A. The Scope of Work to be provided related to this specification system includes, but is not limited to, the following:

1. Selective removal of existing modular carpet tile flooring affected by the replacement of existing interior and exterior doors and frames. Remove additional adjacent modular tile to the extent indicated and as required to provide level transition between existing and new carpet surfaces.
2. Complete removal of existing carpet flooring (and other existing flooring systems) to the extent indicated on the Contract Documents.
3. Completely remove all existing flooring adhesive where existing carpet flooring is selectively removed.
4. Provide all floor preparation necessary for the installation of replacement modular carpet squares.
5. Furnish and install new modular carpet tile.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance. Include installation recommendations for each type of substrate.

B. Qualification Data: For Installer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104, Section 5, "Storage and Handling."

1.6 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength, dimensional stability, and delamination.
3. Warranty Period: Ten (10**)** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE (CPT1)

A. Products: Subject to compliance with requirements, provide one of the following:

1. Mohawk Group Tuff Stuff II “Step Up II”.
   a. Color: Cobalt (955).

B. Size: 24 by 24 inches.

2.2 CARPET TILE (CPT2)

A. Products: Subject to compliance with requirements, provide one of the following:

1. Tarkett Nano 04539 (or similar of equal material cost).
   a. Color: As selected by Architect from manufacturer's full range.
   b. Size: Modular Carpet Tile, 24” x 24”, or 36” x 18”.

2.3 INSTALLATION ACCESSORIES

A. Adhesives: Water-resistant, mildew-resistant, non-staining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
2. Subfloor finishes comply with requirements specified in Division 03 Section "Cast-in-Place Concrete" for slabs receiving carpet tile.
3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.

B. Remove substances that are incompatible with adhesives.

C. Clean metal substrates of grease, oil, soil and rust, and prime if directed by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.

D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.

B. Installation Method: As recommended in writing by carpet tile manufacturer Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive.

C. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove yarns that protrude from carpet tile surface.
3. Vacuum carpet tile using commercial machine with face-beater element.

B. Protect installed carpet tile to comply with CRI 104, Section 16, "Protection of Indoor Installations."

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

3.5 ATTIC STOCK

A. Provide minimum of six (6) unopened boxes of each type and color of carpet tile flooring.

END OF SECTION 096813

SECTION 101000 - VISUAL DISPLAY BOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Wall-mounted markerboard units (MB), magnetic, and accessories.
   2. Wall-mounted tackboard units (TB) and accessories.

1.2 REFERENCES

A. Designation System for Aluminum Finishes; Aluminum Association; 1997.

B. AA SAAA-46 -- Standards for Anodized Architectural Aluminum; Aluminum Association; 1978.

C. FS CCC-W-408C -- Wall Covering, Vinyl-Coated; 1989.

1.3 SUBMITTALS

A. Product Data:
   1. Manufacturer's technical data.
   2. Manufacturer's installation and breaking-in instructions.
   3. Color charts showing full range of standard colors.
   4. Test reports demonstrating compliance with specified requirements.

B. Shop Drawings:
   1. Provide dimensioned elevations of each configuration of markerboard or tackboard.
   2. Show sections of trim members. Key to elevations.
   3. Show anchorage and any necessary grounds.
   4. Show layout and installation details.

C. Samples:
   1. Submit samples of each type of surface, color, and finish.
   2. Surface sample size, each: 5 by 8 inches.
   3. Trim sample size, each: 6 inches long.
   4. Accessories: Submit each type required for project.

1.4 PROJECT CONDITIONS

A. Field measure prior to preparation of shop drawings and fabrication to ensure proper fit.

B. Environmental Requirements:
   1. Install boards only when interior air and substrates have reached equilibrium moisture and temperature approximating that of normal occupied conditions.

1.5 DELIVERY, STORAGE AND HANDLING

A. Schedule delivery of visual display boards with spaces sufficiently complete so that visual display boards can be installed upon delivery.

B. Store products in manufacturer's unopened packaging until ready for installation.

C. Store materials protected from exposure to harmful weather conditions and at temperatures and humidity conditions recommended by manufacturer.

1.6 WARRANTY

A. Porcelain-Enamel Markerboards:
   1. A written guarantee to the Owner by an officer of the manufacturer of the steel chalkboard that all chalkboards which under normal classroom usage do not retain the original visual acuity for fifty (50) years will be replaces with new product in accord with General Conditions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Provide and install markerboard (MB) products complying with or exceeding the requirements of the contract documents. Basis of Design:
   1. Claridge Products and Equipment, Inc. - "LCS-Deluxe" Porcelain Enamel, Aluminum Frame.

B. Provide and install tackboard (TB) products complying with or exceeding requirements of the contract documents. Basis of Design:
   1. Claridge Products and Equipment, Inc. - Series 8, "Fabricork" vinyl surface.

C. Provide and isntall tackstrip (TS) products complying with or exceeding requirements of the contract documents. Basis of Design:
   1. Claridge Products and Equipment, Inc. - 74EZ, 2 9nch rail, cor insert and vinyl surface to match tackboard "Fabricork" color selection.

      a. Lengths: Refer to Contract Drawings.

2.2 MARKER BOARD ASSEMBLIES (MB)

A. Writing Surface Face Sheet - Manufactured in accordance with Porcelain Enamel Institute's specification.
   1. Shall be enameling grade cold rolled steel manufactured from a minimum of 30 percent post-consumer and post-industrial waste.
   2. Enameling grade steel shall be coated with 3 coat enamel process.

      a. Bottom Ground Coat - 1.5 to 2.2 mils.
      b. Top Ground Coat - 2.0 to 2.8 mils.
      c. Top Cover (Color) Coat - 3.0 to 4.0 mils.

3. Firing Temperature: Enamel shall be fired at lowest possible temperatures to reduce steel and porcelain stresses and achieve superior enamel and hardness.
4. Size: Manufacturer's standard and custom dimensions per Contract Drawings.
5. Color: As selected by architect from manufacturer's standards.

B. Writing Surface Core
1. 7/16" Medium Density Fiberboard (MDF) composed of approximately 90% post-industrial waste.

C. Writing Surface Backing
1. Aluminum Sheet Back

D. Factory Framed (Magnetic) Markerboards
1. Face Sheet: LCS-II porcelain enamel steel markerboard.
2. Frame Style: 5/8" Face, mitered corners.
2. Core Material: 7/16" MDF
3. Backing: Aluminum Sheet Back
4. Color: Selected from manufacturer's standard colors.

E. Adhesives: As recommended by manufacturer for the materials and substrates to be joined.

F. No materials or products shall be installed which contain asbestos or asbestos containing materials.

B. Accessories
1. Marker Tray (Not Required)
2. Map Rail
a. Continuous 2" map rail, cork insert, end stops at the top of each markerboard and tackboard, vinyl finish to match tack board "Fabricork.
(1) Map Hooks: Two (2) map hooks per tackboard unit.
(2) Flag Holders: Two (2) per each Room Area.

2.3 TACKBOARD ASSEMBLIES (TB)

A. Vinyl fabric facing on cork underlay with 1/2" hardboard backing.

B. Colors: Selected from manufacturers' standard colors.

C. Size: Manufacturer's standard and custom dimensions per Contract Drawings.

D. Thickness: Total laminated thickness of core and covering is 1/2". All thicknesses are nominal.

E. Factory Framed Tackboards
1. Tack Surface: Fabricork Vinyl factory laminated on cork underlay with 1/4" hardboard backing.
2. Frame: Satin anodized aluminum, 5/8" face, mitered corners.
3. Vinyl Surface Color: Selected from manufacturer's standard colors.

2.4 TACKSTRIP ASSEMBLIES (TS)

A. Aluminum rail, 2 inch.
B. Vinyl fabric facing on cork underlay with 1/2" hardboard backing.
C. Colors: Selected from manufacturers' standard colors.
D. Size: Manufacturer's standard and custom dimensions per Contract Drawings.

2.5 ALUMINUM TRIM

A. Trim shall be 6063 alloy grade aluminum with T5 tempering in accordance with ASTM B221, and shall have 201-R1 satin anodize finish.\
    1. Factory Built Trim
        a. Continuous, metered corners.

2.6 FABRICATION

A. Shop Assembly - Porcelain-Enamel Boards:
    4. Panel joints will be permitted only where panel length exceeds maximum available length. Where joints are necessary, fabricate with joint pattern approved by the Architect.
    5. Joints between writing board sections: Concealed splines.
    6. Joints between writing boards and tack boards: Mullion trim.
    7. Oversized units that must be broken down for shipping shall be factory pre-fit, disassembled, delivered, and reassembled on site.
    8. Tolerance on length and width shall not exceed plus or minus 1/8".

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces to receive units are true and plumb. Correct inadequate surfaces before installation of boards.

B. Verify that moisture and temperature levels of substrate and environment have stabilized.

C. Where necessary, take field measurements before fabrication of units.

3.2 INSTALLATION

A. Deliver factory built units completely assembled and of dimensions shown in details and in accordance with manufacturer's shop drawings as approved by the architect.

B. Follow manufacturer's instructions for storage and handling of units before installation.

C. Do not install boards on damp walls or in damp and humid weather without heat in the building.

D. Install level and plumb, keeping perimeter trim straight in accordance with manufacturer's recommendations.

E. Provide fillers or shims at all partition locations where embedded structural steel column surface is not flush with adjacent masonry partition.

3.3 PROTECTION

A. Verify that all accessories are installed as required for each unit.

B. At completion of work, clean surfaces and trim in accordance with manufacturer's recommendations, leaving all materials ready for use.

C. Cover completed work with building paper or other covering recommended by manufacturer.

D. Protect boards from damage until substantial completion.

END OF SECTION 101000

SECTION 101550 - TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes solid-polymer units as follows:

1. Toilet Enclosures: Floor anchored, overhead braced, solid plastic panels (HDPE).
   a. P1 (ADA): 60" X 60"
      1) Quantity: Total of four (4).
   b. P2 (ADA Alternate): 30 X 60"
      1) Quantity: Total of two (2) .
   c. P3: 30" X 60"
      1) Quantity: Total of ten (8).

2. Urinal Screens: Pilaster-mounted, continuous wall bracket, solid plastic panels (HDPE).
   a. U1: 18" X 48"
      1) Quantity: Total of eight (8).

B. Related Sections include the following:

1.Division 10 "Toilet Accessories" for toilet paper dispensers, grab bars, and similar accessories.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Show locations for compartment-mounted toilet accessories.
2. Show quantity and location of mounting devices and fasteners.
3. Indicate conformance with 2010 ADA Code requirements and indicate any dimensions, components or system configurations which are not in compliance.

C. Samples for Initial Selection: Provide the following for each type of unit indicated:

1. Partition color and finish samples (actual panel samples).

2. Fastener samples for each type of fastener to be furnished and installed.
3. Actual sample of each accessory.

1.4 QUALITY ASSURANCE

A. Comply with requirements in CID-A-A-60003, "Partitions, Toilets, Complete."

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating toilet compartments without field measurements. Coordinate wall, floor, ceilings, and other contiguous construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 SOLID-POLYMER UNITS

A. Manufacturer: The following manufacturer, product, and finish selection is the basis of design:

1. Accurate Partitions Corporation
   a. Color: Black Confetti (9217)

B. Available Manufacturers: Subject to compliance with requirements and matching Basis of Design product and Color Selection, manufacturers offering products that subject to review by the Architect the Owner may elect to be incorporated into the Work include the following:

1. Santana Products, Inc.
2. Global Steel Products Corp.

C. Door, Panel, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges, and with homogenous color and pattern throughout thickness of material.

1. Color and Pattern: One or multiple color and patterns in each room as selected by Architect from manufacturer's full range standard or custom / designer colors and patterns.

D. Pilaster Shoes: Manufacturer's standard design; stainless steel.

E. Brackets (Fittings):

1. Full-Height (Continuous) Type: Manufacturer's heavy-duty design; stainless steel.

F. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum strip fastened to exposed bottom edges of solid-polymer components to prevent burning.

2.2 ACCESSORIES

A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.

1. Material: Stainless steel.

B. Overhead Bracing: Manufacturer's heavy-duty continuous, extruded-aluminum head rail with anti-grip profile and in manufacturer's standard finish.

C. Anchorages and Fasteners: Manufacturer's heavy-duty, exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match hardware, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use hot-dip galvanized or other rust-resistant, protective-coated steel. All panel bracket mounting fasteners shall be heavy duty and shall meet Owner and/or Architect’s approval for long-term durability in the proposed applications. All bracket mounting will be attache to masonry partitions with not less than 200% of the quantity of fasteners furnished in the manufacturer’s standard installation.

2.3 FABRICATION

A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, fasteners, and anchors at pilasters to suit floor conditions. Make provisions for setting and securing continuous head rail at top of each pilaster. Provide shoes at pilasters to conceal supports and leveling mechanism.

B. Floor-Anchored Units: Provide manufacturer's standard or custom heavy-duty, corrosion-resistant anchoring assemblies complete with threaded rods, lock washers, and leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.

C. Doors: Unless otherwise indicated, provide minimum 24-inch- wide in-swinging doors for standard toilet compartments and minimum 36-inch- wide in-swinging or out-swinging doors with a minimum 32-inch- wide clear opening for compartments indicated to be accessible to people with disabilities.

1. Hinges: Manufacturer's continuous, heavy-duty, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees.

2. Latch and Keeper: Manufacturer's heavy-duty latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be accessible to people with disabilities.

3. Coat Hook: Manufacturer's heavy-duty combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.

4. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.

5. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with accessibility requirements of authorities having jurisdiction. Provide units on both sides of doors at compartments indicated to be accessible to people with disabilities.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices. Provide the quantity and spacing of fasteners required by the manufacturer for a heavy-duty installation and as specified.

1. Maximum Clearances:

a. Pilasters and Panels: 1/2 inch.
b. Panels and Walls: 1 inch.

B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Secure continuous head rail to each pilaster with not less than two fasteners and as required for a heavy -duty installation. Hang doors to align tops of doors with tops of panels and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

3.2 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 10155

SECTION 108100 - TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Contractor furnished and Contractor installed toilet accessories:
      a. Grab Bars.
      b. Mirrors.
      c. Sanitary Napkin Disposal.

   2. Owner furnished and Contractor installed toilet accessories:
      a. Surface Mounted Toilet Paper Dispensers.
      b. Surface Mounted Paper Towel Dispensers.
      c. Surface Mounted Soap Dispensers.

B. Accessory locations:
   1. Provide toilet accessories in quantity and locations indicated on drawings and described in this section.

1.2 SUBMITTALS

A. Product Data: Written technical information for each accessory specified.

B. Certificates: Submit certification that work complies with requirements of contract documents.

1.3 QUALITY ASSURANCE

A. Installer's Qualifications: A company regularly engaged in installation of products specified in this section, with a minimum of five (5) years of experience.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Execute product manufacturer's special instructions to prevent damage to products. Store products in manufacturer's original shipping containers.

1.5 COORDINATION

A. Use manufacturer's instructions and data to determine anchorage requirements for products specified. In a timely manner, distribute the following to affected installers of related work:
   1. Components and anchorage devices provided by toilet accessory manufacturer for incorporation into other work.
   2. Coordination data including setting drawings, templates, instructions, etc., for cutouts and installations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. For each distinct type of toilet accessory, provide accessories fabricated by a single manufacturer.

B. Manufacturers: Provide products complying with requirements of the contract documents and made by one of the following:
   1. Bobrick Washroom Equipment, Inc. (Basis of Design).
   2. American Specialties, Inc.
   3. A & J Washroom Accessories.
   4. Bradley Corporation.

2.2 TOILET ACCESSORIES - CONTRACTOR FURNISHED AND CONTRACTOR INSTALLED

A. Sanitary Napkin Disposal Unit: (Fixture Type “SN1”)
   1. Basis of Design: Bobrick, Model No. “B-270.”
   2. Furnish and install in quantities and locations indicated on the Drawings.
      a. Quantity: Five (5) units. (Location to be field coordinated)

B. Grab Bar (Fixture Type “GB1)
   1. Basis of Design: Bobrick, “B-6806.99 Series.”
      a. Manufacturer's standard nonslip gripping surface finish - “peened grip, snap-on flange covers”
      b. Quantity/Size: One (1) 36" and one (1) 48" horizontal, configurations per code and as indicated on drawings.
      c. Quantity/Size: One (1) 18" vertical component, configurations per code and as indicated on drawings.
   2. Furnish and install in quantities and locations indicated on the Drawings.
      a. Total GB1 Quantity: Fourteen (14) units.

C. Grab Bar (Fixture Type “GB2)
   1. Basis of design: Bobrick, “B-6806.99 Series.”
      c. Manufacturer's standard nonslip gripping surface finish - “peened grip, snap-on flange covers”
      d. Quantity/Size: Two (2) 48" horizontal, configurations per code and as indicated on drawings.
   2. Furnish and install in quantities and locations indicated on the Drawings.
      a. Total GB2 Quantity: Four (4) units.

D. Mirror (Fixture Type “MR1")
   1. Basis of Design: Bobrick, “B-290 2436".
      a. Size: 24" x 36".
   2. Furnish and install in quantities and locations indicated on the Drawings.
      a. Quantity: Nine (9) units.

E. Mirror (Fixture Type “MR2")
   1. Basis of Design: Bobrick, “B-290 2460".
      a. Size: 24" x 60".
   2. Furnish and install in quantities and locations selected by Owner/Architect.

a. Quantity: Four (4) units.

2.3 TOILET ACCESSORIES - OWNER FURNISHED AND CONTRACTOR INSTALLED

A. Surface Mounted Toilet Paper Dispenser (Fixture Type “TP1”).
1. Quantity: Restroom: Thirty Eight (38).

B. Surface Mounted Paper Towel Dispenser (Fixture Type “PT1”).
1. Quantity: Restroom: Twenty (20).
2. Quantity: Classrooms (Deer Path School): One (1) per classroom.

C. Soap Dispenser (Fixture Type “SD1”).
1. Quantity: Classroom Restrooms (Deer Path): One (1) per restroom.
2. Quantity: Classrooms (Deer Path): One (1) per classroom.

2.4 MATERIALS

A. Mounting Devices and Fasteners: Provide toilet accessory manufacturer's recommended items for substrates and conditions indicated.

2.5 FABRICATION

A. Manufacturer's Trademarks and Model Numbers: Neither name nor trademark of manufacturer is acceptable on exposed surfaces of accessories. Provide manufacturer's name and model number on stamped plate or waterproof label securely affixed to unexposed surface of accessory.

B. Surface Mounted Accessories: Where possible, design accessory to provide concealed anchorage when installed. Precisely-fit seams and joints. Roll exposed edges unless indicated otherwise. Use full-length stainless steel piano-type hinges for access doors and panels.

C. Recess Mounted Accessories: Design accessories to provide concealed anchorage when closed. Weld all joints. Precisely miter corners where indicated. Use full-length stainless steel piano-type hinges for access doors and panels.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Accessory Locations: Coordinate accessory locations with other work to avoid interference and to ensure proper operation and servicing of accessories. Notify the Architect in writing of any conflicts concerning product placement, for resolution. Do not proceed without resolution.

B. Correct unsatisfactory substrate conditions before start of accessory installation.

3.2 PREPARATION

A. Clean surfaces to receive accessories. Protect surrounding elements from damage during accessory installation.

3.3 INSTALLATION

A. Perform installation in accordance with manufacturer's instructions, except where more stringent requirements are shown or specified, and except where project conditions require extra precautions or provisions to ensure satisfactory performance of the work.

B. Provide plumb, level accessory installations.

C. Securely attach accessories to substrate.

D. Accessories installed for use by Handicapped Persons: Install as indicated on drawings.

3.4 ADJUSTING

A. Adjust accessories as required to provide smooth operation and trouble free servicing.

3.5 CLEANING

A. Clean and polish exposed surfaces of accessories using accessory manufacturer's recommended procedures and cleaning agents.

3.6 PROTECTION

A. Provide coverings as required to protect installed accessories.

END OF SECTION 108100

SECTION 123010 - LAMINATE CLAD CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fabrication, delivery and installation of prefabricated plastic laminate casework, including all fillers, scribes, finished ends, finished backs, work surfaces, backsplashes, cutouts and accessories as indicated on the drawings and as required for a complete installation.
2. All products shown on the drawings and specified herein shall be by the same supplier for single source responsibility.

1.2 SCOPE OF WORK

A. The scope of work generally includes, but is not limited to, the following:

1. Furnish and install new base cabinets, wall-mounted cabinets, display cases, countertops, base shelving units.
2. Remove, salvage, and reinstall existing tall wardrobe cabinet units (maximum of 12) in locations selected by Owner.

1.3 QUALITY ASSURANCE

A. Manufacturers' products shall be publicly catalogued. Manufacturer will show evidence of a minimum of five (5) years experience in providing manufactured casework systems for similar size and type of projects.

1.4 SUBMITTALS

A. Samples:

1. Submit samples of casework manufacturer's standard decorative laminate colors, patterns and textures for exposed and semi-exposed materials for Architect's selection.

B. Production Drawings:

1. Submit computer generated production drawings for casework systems, countertops, and related products showing plan view layout of units, elevations, and cross-section details.
2. Coordinate production drawings with other work involved.

1.5 PRODUCT HANDLING

A. Protect cabinet and countertops during transit, delivery, storage and handling to prevent damage, soiling and deterioration.

B. Store cabinets and countertops at project site installation and storage areas with similar ambient conditions as final installation. Storage areas must be kept dry, heated with low relative humidity and away from construction work such as painting, wet work, grinding and similar operations.

1.6 WARRANTY

A. Product Warrantee: Casework manufacturer shall warrant for a period of two (2) years, the product manufactured by it to be free from defects in material and workmanship when properly installed under normal use, from date of Substantial Completion.

B. Installer Warrantee: casework installer shall warrant the installation for a period of two (2) years, from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to meeting all the requirements specified, prefabricated (with custom modifications to standard components to meet product requirements) or custom shop fabricated plastic laminate casework fabricated by a single manufacturer and meeting the contract requirements.

2.2 MATERIALS

A. Core Materials:

1. Cabinet components having particle board core material shall be of a minimum 45 lb. density, M-2 industrial grade. Particleboard used shall have been tested under ANSI A208.1 1993 standards and / or ASTMD 1037-91A.
2. Medium density fiberboard (MDF) shall be used in high stress areas as drawer members and shall be minimum 48 lb. density MD-21 grade and tested under ANSI A208.2 1994 Standards.
3. Industrial hardboard shall be pre-finished 1/4" thickness composed of wood fibers, phenolic resin binders and moisture inhibitors that meet or exceed the hardboard product standard ANSI/AHA A135.4 1988.

B. Surface Materials:

1.Exposed exteriors shall be High pressure decorative plastic laminate thermoset to core using catalyzed PVA glue with a minimum average pressure of 90 PSI and average 180 degree F. temperature. High pressure decorative plastic laminate shall meet NEMA LD 3-1995, VGS.028 specification standards. High-pressure decorative laminate GP28 (.028), NEMA Test LD-3-1995.

2. Exposed doors and drawer fronts shall be High pressure decorative plastic laminate thermoset to core using catalyzed PVA glue with a minimum average pressure of 90 PSI and average 180 degree F. temperature. High pressure decorative plastic laminate shall meet NEMA LD 3-1995, VGS.028 specification standards.

3. Exposed interiors shall be High pressure decorative plastic laminate thermoset to core using catalyzed PVA glue with a minimum average pressure of 90 PSI and average 180 degree F. temperature. High pressure decorative plastic laminate shall meet NEMA LD 3-1995, VGS.028 specification standards.
4. Semi-exposed and concealed surfaces shall be permanently thermofused melamine laminate or high pressure decorative plastic laminate cabinet liner, 0.020" thickness for balanced construction. Thermofused melamine laminate shall meet the ALA 1996 specifications standards, as tested against the high pressure laminate NEMA LD 3-1995, VGS.028 specification standards.
5. Finishes to be laminate manufacture's matte, suede, or equivalent finish as approved by architect. Samples will be reviewed by architect for color, texture, and pattern only.

C. Edging Materials:

1. Semi-exposed exterior cabinet front edges (cabinets with doors and drawers) shall be banded with a contrasting or matching 3mm (1/8") PVC extrusion. Edging shall have a satin finish with a UV cured top coat for additional durability. The PVC edging shall be applied with waterproof hot melt adhesive, and shaped to provide radiused edges and radiused corners.
2. Exposed exterior cabinet front edges shall be banded with a contrasting or matching 3mm (1/8") PVC extrusion. Edging shall have a satin finish with a UV cured top coat for additional durability. The PVC edging shall be applied with waterproof hot melt adhesive, and shaped to provide radiused edges and radiused corners.
3. Door and drawer front edges shall be banded with a contrasting or matching 3mm (1/8") PVC extrusion. Edging shall have a satin finish with UV cured top coat for additional durability. The 3mm thick edging shall be applied with waterproof hot melt adhesive, and shaped to provide radiused edges and radiused corners.
4. Adjustable shelves shall be banded with 0.020” thick PVC extrusion, resistant to chip, crack, and high impact. Edging shall have a satin finish with a UV cured top coat for additional durability. Edging shall be applied with waterproof hot melt adhesive to front edge of all adjustable shelves.
5. All other interior components, including drawers, shall be banded with a PVC extrusion, 0.020" in thickness, resistant to chip, crack, and high impact. Edging shall have a satin finish with a UV cured top coat for additional durability. Edging to be machine applied with waterproof hot melt adhesive.

2.4 COLOR SELECTIONS

A. Exposed cabinet exteriors, door/drawer fronts and open interiors shall be chosen from: Wilsonart, (Design Group One) (or others as required to match existing) in high pressure decorative plastic laminate.

B. Exposed exterior surfaces of replacement splashes shall match existing to reamin plastic laminate countertop.

C. Semi-exposed surfaces, including drawer box components, shall be finished in either pearl or grey as selected from casework manufacturer's standard interior color selections.

D. Exposed interior components, including both faces of shelves and interior face of backs, to be permanently thermofused melamine laminate matching exposed cabinet exteriors.

E. 3mm thick PVC edging, where specified, shall be selected from a minimum of twenty-two (22) standard matching or contrasting trim group colors.

F. 0.020” thick PVC, where specified, shall be selected from the manufacturer’s full line of standard matching or contrasting trim group colors.

G. Semi-exposed edges of cabinet components including drawers, shall be either pearl or gray in 0.020" thick PVC.

H. Five knuckle hinges in epoxy finish colors (available with black, pearl (white) or gray minimum), and finish to match pulls option.

I. Pulls shall be available in bent wire contour design. Bent wire pulls shall be available in epoxy colors, chrome, brushed chrome, of brushed aluminum finish.

2.5 HARDWARE

A. Hinges shall be heavy duty five knuckle style, with interlaying leaves capable of 270 degree swing. Hinge shall be constructed of 0.090" minimum thickness steel, hospital tipped, with non-removable pin. Doors less than 48" in height shall have two (2) hinges per door. Doors exceeding 48" in height shall have three (3) hinges per door minimum.

B. Door catches shall be a heavy-duty magnetic, installed at bottom edge. All doors over 48" in height shall be provided with catch at both top and bottom of door.

C. Pulls shall be metal bent wire, 4" length.

D. Drawers shall be full extension file use and shall be suspended with bottom mount, side and bottom attached heavy-duty nylon roller epoxy coated steel slides to ensure quiet, smooth operation. Lateral stability is achieved thru a special formed captive profile. Slides shall have 150 lb. load rating, with both in and out drawer stop, and 3" self close feature and a side adjustment cam allowing 3mm side to side alignment. File drawer shall include extruded top mounted molded side rails to accept standard hanging file folders.

E. Shelf support clips for 1" thick adjustable shelves shall be heavy-duty injection molded resilient polycarbonate. Support clips shall incorporate integral molded lock tabs to retain shelf from tipping or inadvertently being lifted out. Metal or aluminum support clip shall have 5mm dia. double pin engagement into precision bored hole pattern in cabinet vertical members. Clips shall have a molded ridge which provide pressure against edge of shelving to maintain positive pin engagement. Clip shall be designed in such a manner to provide means for permanent retention to shelf. Static test load must

exceed 200 lb. per clip.

J. Dividers that are 1/4" thick shall be fully adjustable and retained with injection molded clear polycarbonate clip.

K. Locks shall be cylinder type, die cast, with five (5) disc tumbler mechanism. Each lock shall be provided with milled brass key. Master keying shall be available. Cabinets shall be keyed alike for entire project, unless otherwise specified. Locks shall be removable core to give flexibility for different pass key options. Locks shall be provided where indicated on drawings.

2.6COMPONENTS

A. General: Provide the following components and cabinet configurations, unless noted otherwise on the Contract Drawings.

B. Base, Wall and Tall cabinet ends shall be 3/4" thick particle board, laminated for balanced construction, surfaced as described in paragraph 2.2 and edged as described in paragraph 2.2.

B. Base and Tall cabinet tops and bottoms shall be 3/4" thick particle board, laminated for balanced construction, surfaced as described in paragraph 2.2 and edged as described in paragraph 2.2.

C. Wall cabinet top and bottom shall be 1" thick particle board, laminated for balanced construction, surfaced as described in paragraph 2.2 and edged as described in paragraph 2.2.

D. Vertical cabinet members shall be 3/4" thick particle board, laminated for balanced construction, surfaced as described in paragraph 2.2 and edged as described in paragraph 2.2.

E. Cabinet backs shall be 1/2" thick minimum, pre-finished industrial hardboard.

F. Frame rails shall be 3/4" thick x 3-3/4" wide particle board, laminated for balanced construction, surfaced, as described in paragraph 2.2 and edged as described in paragraph 2.2.

G. Sub-base shall consist of two (2) toe kick support rails of 3/4" thick x 3-3/4" high particle board and be inset from cabinet front and back edge, to give additional load support. Base inset depth to match, and not exceed, depth of existing cabinet inset depth.

H. Mounting rails shall be 3/4" thick x 3-3/4" wide particle board. Wall cabinets shall have rails positioned at the top and bottom. Tall cabinets shall have rails positioned at the top and intermediate location. Base cabinet shall have rails positioned at the top of unit.

I. Drawers shall be full box design with a separate front. Drawer sides and ends shall be constructed of 5/8" medium density fiberboard with pearl or grey color thermofused

melamine laminate and matching PVC top edges. Bottoms shall be ½" thick medium density fiberboard, pearl or grey color thermofused melamine laminate.

J. Adjustable shelves shall be 1" thick, regardless of cabinet width. Edges of shelf shall be banded as described in paragraph 2.2.

K. Solid hinged doors, sliding doors and drawer fronts shall be 3/4" thick material of balanced construction, surfaced and edged as described in paragraph 2.2.

L. Label Holders: Provide cabinet door and drawer mounted label holders at locations indicated on drawings. Label Holders to be approximately 1" x 3", aluminum and/or finish to match hinges / door pulls.

2.6

2.7 CONSTRUCTION

A. Cabinet parts shall be accurately machined and precision bored for premium grade quality joinery construction, utilizing automatic machinery to ensure consistent sizing on modular cabinets. Cabinets shall be assembled under controlled case clamp conditions, assuring final cabinet squareness and proper joint compressions.

B. Cabinet ends shall be bored to receive 8mm, industrial grade hardwood laterally fluted dowels with chamfered ends. Cabinet ends shall be prepared to receive adjustable shelf hardware at 32mm (approximately 1 1/4") centers. Door hinges and drawer slides shall be machined drilled to maintain vertical and horizontal alignment of components. Inset grooving with chamfer shall be machined 3/4" from rear edge to accept the back. Base and Tall units shall have one piece end panels continuous to floor for added load capabilities.

C. Tops and bottoms shall be joined to cabinet ends using a minimum of six (6) dowels at each joint for twenty-four (24) inch deep cabinets and a minimum of four (4) dowels at each joint, for twelve (12) inch deep cabinets. All dowels to be industrial grade hardwood, laterally fluted, with chamfered ends and 8mm in diameter. Top of base cabinet will be full depth. Inset grooving with chamfer shall be machined 3/4" from rear edge to accept the back.

D. Vertical dividers shall be bored to receive adjustable shelf hardware at 32mm (approximately 1-1/4") centers. Dividers shall be joined to tops and bottoms with 8mm diameter hardwood dowels. Bore holes shall be spaced to insure an adjustable shelf can be installed centered in cabinet height.

E. Frame rails shall be joined to ends with 8mm diameter hardwood dowels.

F. Two (2) toe kick supports shall be inset from cabinet front and back edges, and doweled into cabinet ends with 8mm hardwood dowels. Provide removable kick (screw fasteners) at all locations where access to plumbing floor clean-outs are required.

G. Mounting rails shall be fully concealed behind backs. Rails shall be 3/4" thick and fastened to cabinet ends with 8mm hardwood dowels. Wall and tall cabinet shall incorporate two mounting rails. Wall cabinets shall have rails positioned at top and

bottom. Tall cabinets shall have rails positioned at top and intermediate location. Base units shall have rail positioned in the upper back area.

H. Back panels shall be ½" thick and inset 3/4" from rear edge of cabinet. Back shall be glued and continuously trapped in top, bottom, and ends of cabinets.

I. Drawer corner joints shall be interlocking dowel pin design. Hardwood dowel pins, 8mm diameter shall be inserted into drawer fronts and backs to fit into machined hole patterns in drawer sides. Bottoms shall be trapped into grooves on all four sides glued and mechanical fastened. Drawers shall be suspended on slides as described in article 2.4.

2.8 WORK SURFACES

A. Core material having particle board shall be of a minimum 45 lb. density, M-2 industrial grade. The particleboard used shall have been tested under ANSI A208.1 1993 standards and / or ASTMD 1037-91A.

B. Surface material shall be high pressure decorative plastic laminate thermoset to core using catalyzed PVA glue with a minimum average pressure of 90 PSI and average 180 degree F. temperature. High pressure decorative plastic laminate shall meet NEMA LD 3-1995, HGP.039 specification standards.

C. Color selection shall be Wilsonart color groups in high pressure decorative plastic laminate, at Architect's option.

D. Exposed edges shall be 3mm PVC. The edging shall be applied with waterproof hot melt adhesive.

E. Underside of all worksurfaces to have BK-20 backer or approved equivalent. This balance sheet shall be thermoset to core using catalyzed PVA glue with a minimum average pressure of 90 PSI and average 180 degree F. temperature.

F. Design and construction of work surfaces shall be 30mm (1-3/16") thick, with 3mm PVC edge band. Laminate countertops shall have wafers for alignment and tight-joint fasteners at all joints. Top edge of separate back splashes and end splashes to have 90 degree radius profile on upper edge, with 3mm PVC edge band top and exposed ends. Where countertops abut wall or tall cabinet, separate end splashes are to be provided.

PART 3 - EXECUTION

3.1 INSPECTION

A. The installer shall examine the job site and the conditions under which the work under this section is to be performed, and notify the General Contractor in writing immediately of any unsatisfactory conditions. Do not proceed with work under this section until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

3.2 PREPARATION

A. Casework, countertops and related materials to be conditioned to average prevailing humidity conditions in installation areas prior to start of work.

3.3 INSTALLATION

A. Install casework and countertops with factory-trained factory authorized supervision. Casework shall be installed plumb, level, true and straight with no distortions. Shim as required using concealed shims. Securely attach to building structure with anchorage devices of appropriate type, size and quantity. Where laminate clad casework abuts other finished work, scribe and cut to accurate fit.

B. Adjust casework and hardware so that doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

C. Wall cabinets shall be securely fastened to horizontal wood blocking or masonry substrate.

D. Securely adhere in place all countertops with screw fasteners.

E. Provide vertical filler panels at locations indicated on drawings. All filler panels shall match adjacent casework finish. Provide horizontal filler panels at the top and bottom of wall cabinets to close void behind vertical filler panel.

F. Provide silicone sealant at all junctures between countertop (including backsplash and sidesplash) and partitions.

3.4 CLEANING AND PROTECTION

A. Repair or remove and replace defective work as directed by the Architect upon completion of installation.

B. Clean shop-finished and plastic surfaces, repair minor damage per plastic laminate manufacturer's recommendations. Replace other damaged parts or units.

C. Contractor shall provide protection of work installed under this section until date of Substantial Completion. This Contractor and the General Contractor shall ensure that casework and countertops are not used as construction work surfaces, walkways, or in lieu of ladders, by any trade. Contractor shall be responsible for repair or replacement of any item damaged after installation is complete.

D. Make final adjustments to all doors and drawers. Doors shall swing freely, catches shall hold securely, and doors shall be aligned vertically, horizontally and perpendicular to face of door. Drawers shall open and close smoothly, without binding and without excessive side play.

E. Provide the following attic stock materials to Owner at Substantial Completion:

1. Door Catches: Twelve (12).

2. Pulls: Twelve (12).
3. Shelf Supports: Fifty (50).

END OF SECTION 123010

SECTION 019113 - GENERAL COMMISSIONING REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. Commissioning is intended to achieve the following specific objectives; this section specifies the Contractor's responsibilities for commissioning:
   1. Verify that the work is installed in accordance with Contract Documents and the manufacturer’s recommendations and instructions, and that it receives adequate operational checkout prior to startup: Startup reports and Prefunctional Checklists executed by Contractor are utilized to achieve this.
   2. Verify and document that functional performance is in accordance with Contract Documents: Functional Tests executed by Contractor and witnessed by the Commissioning Authority are utilized to achieve this.
   3. Verify that operation and maintenance manuals submitted to Owner are complete: Detailed operation and maintenance (O&M) data submittals by Contractor are utilized to achieve this.
   4. Verify that the Owner’s operating personnel are adequately trained: Formal training conducted by Contractor is utilized to achieve this.
B. Commissioning, including Functional Tests, O&M documentation review, and training, is to occur after startup and initial checkout and be completed before Functional Completion.
C. The Commissioning Authority directs and coordinates all commissioning activities; this section describes some but not all of the Commissioning Authority's responsibilities.
D. All documents and the management of the construction process will be done through the use of Procore. All contractors will be required to complete all construction checklists within the Procore site. Greener Engineering will provide access to the site.
E. The Commissioning Process for systems defined in the scope of work in these specifications will be led by an independent Commissioning Authority (CxA), reporting directly to the Design Team/Owner/Construction Manager. The CxA for this project will be Greener Engineering

1.02 SCOPE OF COMMISSIONING

A. The following are to be commissioned:
B. Plumbing Systems:
C. HVAC System, including:
   1. Major and minor equipment items.
   2. Piping systems and equipment.
   3. Ductwork and accessories.
   4. Terminal units.
   5. Control system.
   6. Variable frequency drives.
D. Electrical Systems:
   1. Lighting controls other than manual switches.
E. Electronic Safety and Security:
   1. Fire, CO and smoke alarms in conjunction to new mechanical equipment
F. Other equipment and systems explicitly identified elsewhere in Contract Documents as requiring commissioning.

1.03 RELATED REQUIREMENTS

A. Section 220800 - Commissioning of Plumbing
B. Section 230800 - Commissioning of HVAC: HVAC control system testing; other requirements.
C. Section 260800 - Commissioning of Electrical

1.04 REFERENCE STANDARDS

A. PECI (Samples) - Sample Forms for Prefunctional Checklists and Functional Performance Tests; Current Edition.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures; except:
   1. Make all submittals specified in this section, and elsewhere where indicated for commissioning purposes, directly to the Commissioning Authority, unless they require review by Engineer; in that case, submit to Engineer first.
   2. Submit one copy to the Commissioning Authority, not to be returned.
   3. Make commissioning submittals on time schedule specified by Commissioning Authority.
   4. Submittals indicated as "Draft" are intended for the use of the Commissioning Authority in preparation of Prefunctional Checklists or Functional Test requirements; submit in editable electronic format, Microsoft Word 2010 preferred.
   5. As soon as possible after submittals made to Engineer are approved, submit copy of approved submittal to the Commissioning Authority.
B. Product Data: If submittals to Engineer do not include the following, submit copies as soon as possible:
   1. Manufacturer's product data, cut sheets, and shop drawings.
   2. Manufacturer's installation instructions.
   3. Startup, operating, and troubleshooting procedures.
   4. Fan and pump curves.
   5. Factory test reports.
   6. Warranty information, including details of Owner's responsibilities in regard to keeping warranties in force.
C. Manufacturers' Instructions: Submit copies of all manufacturer-provided instructions that are shipped with the equipment as soon as the equipment is delivered.
D. Startup Plans and Reports.
E. Completed Prefunctional Checklists.

PART 2 PRODUCTS

2.01 TEST EQUIPMENT

A. Provide all standard testing equipment required to perform startup and initial checkout and required Functional Testing; unless otherwise noted such testing equipment will NOT become the property of Owner.
B. Calibration Tolerances: Provide testing equipment of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified. If not otherwise noted, the following minimum requirements apply:

1. Temperature Sensors and Digital Thermometers: Certified calibration within past year to accuracy of 0.5 degree F and resolution of plus/minus 0.1 degree F.
2. Pressure Sensors: Accuracy of plus/minus 2.0 percent of the value range being measured (not full range of meter), calibrated within the last year.
3. Calibration: According to the manufacturer's recommended intervals and when dropped or damaged; affix calibration tags or keep certificates readily available for inspection.

C. Equipment-Specific Tools: Where special testing equipment, tools and instruments are specific to a piece of equipment, are only available from the vendor, and are required in order to accomplish startup or Functional Testing, provide such equipment, tools, and instruments as part of the work at no extra cost to Owner; such equipment, tools, and instruments are to become the property of Owner.

D. Dataloggers: Independent equipment and software for monitoring flows, currents, status, pressures, etc. of equipment.
1. Dataloggers required to for Functional Tests will be provided by the Commissioning Authority and will not become the property of Owner.

PART 3 EXECUTION

3.01 COMMISSIONING PLAN

A. Commissioning Authority will prepare the Commissioning Plan.
1. Attend meetings called by the Commissioning Authority for purposes of completing the commissioning plan.
2. Require attendance and participation of relevant subcontractors, installers, suppliers, and manufacturer representatives.

B. Contractor is responsible for compliance with the Commissioning Plan.

C. Commissioning Plan: The commissioning schedule, procedures, and coordination requirements for all parties in the commissioning process.

D. Commissioning Schedule:
1. Submit anticipated dates of startup of each item of equipment and system to Commissioning Authority within 60 days after award of Contract.
2. Re-submit anticipated startup dates monthly, but not less than 4 weeks prior to startup.
3. Prefunctional Checklists and Functional Tests are to be performed in sequence from components, to subsystems, to systems.
4. Provide sufficient notice to Commissioning Authority for delivery of relevant Checklists and Functional Test procedures, to avoid delay.

3.02 STARTUP PLANS AND REPORTS

A. Startup Plans: For each item of equipment and system for which the manufacturer provides a startup plan, submit the plan not less than 8 weeks prior to startup.

B. Startup Reports: For each item of equipment and system for which the manufacturer provides a startup checklist (or startup plan or field checkout sheet), document compliance by submitting the completed startup checklist prior to startup, signed and dated by responsible entity.

C. Submit directly to the Commissioning Authority.

3.03 PREFUNCTIONAL CHECKLISTS

A. A Prefunctional Checklist is required to be filled out for each item of equipment or other assembly specified to be commissioned.

1. No sampling of identical or near-identical items is allowed.
2. These checklists do not replace manufacturers' recommended startup checklists, regardless of apparent redundancy.
3. Prefunctional Checklist forms will not be complete until after award of the contract; the following types of information will be gathered via the completed Checklist forms:
    a. Certification by installing contractor that the unit is properly installed, started up, and operating and ready for Functional Testing.
    b. Confirmation of receipt of each shop drawing and commissioning submittal specified, itemized by unit.
    c. Manufacturer, model number, and relevant capacity information; list information "as specified," "as submitted," and "as installed."
    d. Serial number of installed unit.
    e. List of inspections to be conducted to document proper installation prior to startup and Functional Testing; these will be primarily static inspections and procedures; for equipment and systems may include normal manufacturer’s start-up checklist items and minor testing.
    f. Sensor and actuator calibration information.
4. PECI (Samples) found at http://www.peci.org/library/mcpgs.htm indicate anticipated level of detail for Prefunctional Checklists.

B. Contractor is responsible for filling out Prefunctional Checklists, after completion of installation and before startup; witnessing by the Commissioning Authority is not required unless otherwise specified.
1. Each line item without deficiency is to be witnessed, initialed, and dated by the actual witness; checklists are not complete until all line items are initialed and dated complete without deficiencies.
2. Checklists with incomplete items may be submitted for approval provided the Contractor attests that incomplete items do not preclude the performance of safe and reliable Functional Testing; re-submission of the Checklist is required upon completion of remaining items.
3. Individual Checklists may contain line items that are the responsibility of more than one installer; Contractor shall assign responsibility to appropriate installers or subcontractors, with identification recorded on the form.
4. If any Checklist line item is not relevant, record reasons on the form.
5. Contractor may independently perform startup inspections and/or tests, at Contractor's option.
6. Regardless of these reporting requirements, Contractor is responsible for correct startup and operation.
7. Submit completed Checklists to Commissioning Authority within two days of completion.

C. Commissioning Authority is responsible for furnishing the Prefunctional Checklists to Contractor.
1. Initial Drafts: Contractor is responsible for initial draft of Prefunctional Checklist where so indicated in Contract Documents.
2. Provide all additional information requested by Commissioning Authority to aid in preparation of checklists, such as shop drawing submittals, manufacturers' startup checklists, and O&M data.
3. Commissioning Authority may add any relevant items deemed necessary regardless of whether they are explicitly mentioned in Contract Documents or not.

4. When asked to review the proposed Checklists, do so in a timely manner.

D. Commissioning Authority Witnessing: Required for:
   1. Each piece of primary equipment, unless sampling of multiple similar units is allowed by the commissioning plan.
   2. A sampling of non-primary equipment, as allowed by the commissioning plan.

E. Deficiencies: Correct deficiencies and re-inspect or re-test, as applicable, at no extra cost to Owner.
   1. If difficulty in correction would delay progress, report deficiency to the Commissioning Authority immediately.

3.04 FUNCTIONAL TESTS

A. A Functional Test is required for each item of equipment, system, or other assembly specified to be commissioned, unless sampling of multiple identical or near-identical units is allowed by the final test procedures.

B. Contractor is responsible for execution of required Functional Tests, after completion of Prefunctional Checklist and before closeout.

C. Commissioning Authority is responsible for witnessing and reporting results of Functional Tests, including preparation and completion of forms for that purpose.

D. Contractor is responsible for correction of deficiencies and re-testing at no extra cost to Owner; if a deficiency is not corrected and re-tested immediately, the Commissioning Authority will document the deficiency and the Contractor's stated intentions regarding correction.
   1. Deficiencies are any condition in the installation or function of a component, piece of equipment or system that is not in compliance with Contract Documents or does not perform properly.
   2. When the deficiency has been corrected, the Contractor completes the form certifying that the item is ready to be re-tested and returns the form to the Commissioning Authority; the Commissioning Authority will reschedule the test and the Contractor shall re-test.
   3. Identical or Near-Identical Items: If 10 percent, or three, whichever is greater, of identical or near-identical items fail to perform due to material or manufacturing defect, all items will be considered defective; provide a proposal for correction within 2 weeks after notification of defect, including provision for testing sample installations prior to replacement of all items.
   4. Contractor shall bear the cost of Owner and Commissioning Authority personnel time witnessing re-testing.
   5. Contractor shall bear the cost of Owner and Commissioning Authority personnel time witnessing re-testing if the test failed due to failure to execute the relevant Prefunctional Checklist correctly; if the test failed for reasons that would not have been identified in the Prefunctional Checklist process, Contractor shall bear the cost of the second and subsequent re-tests.

E. Functional Test Procedures:
   1. Some test procedures are included in Contract Documents; where Functional Test procedures are not included in Contract Documents, test procedures will be determined by the Commissioning Authority with input by and coordination with Contractor.
   2. Examples of Functional Testing:
      a. Test the dynamic function and operation of equipment and systems (rather than just components) using manual (direct observation) or monitoring methods under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure setpoint).

b. Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc.
c. Systems are run through all the HVAC control system’s sequences of operation and components are verified to be responding as the sequence's state.
d. Traditional air or water test and balancing (TAB) is not Functional Testing; spot checking of TAB by demonstration to the Commissioning Authority is Functional Testing.

F. Deferred Functional Tests: Some tests may need to be performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions; performance of these tests remains the Contractor's responsibility regardless of timing.

3.05 SENSOR AND ACTUATOR CALIBRATION

A. Calibrate all field-installed temperature, relative humidity, carbon monoxide, carbon dioxide, and pressure sensors and gauges, and all actuators (dampers and valves) on this piece of equipment shall be calibrated. Sensors installed in the unit at the factory with calibration certification provided need not be field calibrated.

B. Calibrate using the methods described below; alternate methods may be used, if approved by Commissioning Authority and Owner beforehand. See PART 2 for test instrument requirements. Record methods used on the relevant Prefunctional Checklist or other suitable forms, documenting initial, intermediate and final results.

C. All Sensors:
1. Verify that sensor location is appropriate and away from potential causes of erratic operation.
2. Verify that sensors with shielded cable are grounded only at one end.
3. For sensor pairs that are used to determine a temperature or pressure difference, for temperature make sure they are reading within 0.2 degree F of each other, and for pressure, within tolerance equal to 2 percent of the reading, of each other.
4. Tolerances for critical applications may be tighter.

D. Sensors Without Transmitters - Standard Application:
1. Make a reading with a calibrated test instrument within 6 inches of the site sensor.
2. Verify that the sensor reading, via the permanent thermostat, gauge or building automation system, is within the tolerances in the table below of the instrument-measured value.
3. If not, install offset, calibrate or replace sensor.

E. Sensors With Transmitters - Standard Application.
1. Disconnect sensor.
2. Connect a signal generator in place of sensor.
3. Connect ammeter in series between transmitter and building automation system control panel.
4. Using manufacturer’s resistance-temperature data, simulate minimum desired temperature.
5. Adjust transmitter potentiometer zero until 4 mA is read by the ammeter.
6. Repeat for the maximum temperature matching 20 mA to the potentiometer span or maximum and verify at the building automation system.
7. Record all values and recalibrate controller as necessary to comply with specified control ramps, reset schedules, proportional relationship, reset relationship and P/I reaction.

8. Reconnect sensor.
9. Make a reading with a calibrated test instrument within 6 inches of the site sensor.
10. Verify that the sensor reading, via the permanent thermostat, gauge or building automation system, is within the tolerances in the table below of the instrument-measured value.
11. If not, replace sensor and repeat.
12. For pressure sensors, perform a similar process with a suitable signal generator.

F. Sensor Tolerances for Standard Applications: Plus/minus the following maximums:
1. Watthour, Voltage, Amperage: 1 percent of design.
2. Pressure, Air, Water, Gas: 3 percent of design.
3. Air Temperatures (Outside Air, Space Air, Duct Air): 0.4 degrees F.
4. Relative Humidity: 4 percent of design.
5. Barometric Pressure: 0.1 inch of Hg.
6. Flow Rate, Air: 10 percent of design.
7. Flow Rate, Water: 4 percent of design.
8. AHU Wet Bulb and Dew Point: 2.0 degrees F.
9. Hot Water Coil and Boiler Water Temperature: 1.5 degrees F.
10. Cooling Coil, Chilled and Condenser Water Temperatures: 0.4 degrees F.
11. Combustion Flue Temperature: 5.0 degrees F.
12. Oxygen and CO2 Monitors: 0.1 percentage points.
13. CO Monitor: 0.01 percentage points.

G. Critical Applications: For some applications more rigorous calibration techniques may be required for selected sensors. Describe any such methods used on an attached sheet.

H. Valve/Damper Stroke Setup and Check:
1. For all valve/damper actuator positions checked, verify the actual position against the control system readout.
2. Set pump/fan to normal operating mode.
3. Command valve/damper closed; visually verify that valve/damper is closed and adjust output zero signal as required.
4. Command valve/damper to open; verify position is full open and adjust output signal as required.
5. Command valve/damper to a few intermediate positions.
6. If actual valve/damper position does not reasonably correspond, replace actuator or add pilot positioner (for pneumatics).

I. Isolation Valve or System Valve Leak Check: For valves not associated with coils.
1. With full pressure in the system, command valve closed.
2. Use an ultra-sonic flow meter to detect flow or leakage.

3.06 TEST PROCEDURES - GENERAL

A. Provide skilled technicians to execute starting of equipment and to execute the Functional Tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.

B. Provide all necessary materials and system modifications required to produce the flows, pressures, temperatures, and conditions necessary to execute the test according to the specified conditions. At completion of the test, return all affected equipment and systems to their pre-test condition.

C. Sampling: Where Functional Testing of fewer than the total number of multiple identical or near-identical items is explicitly permitted, perform sampling as follows:
   1. Identical Units: Defined as units with same application and sequence of operation; only minor size or capacity difference.
   2. Sampling is not allowed for:
      a. Major equipment.
      b. Life-safety-critical equipment.
      c. Prefunctional Checklist execution.
   3. XX = the percent of the group of identical equipment to be included in each sample; defined for specific type of equipment.
   4. YY = the percent of the sample that if failed will require another sample to be tested; defined for specific type of equipment.
   5. Randomly test at least XX percent of each group of identical equipment, but not less than three units. This constitutes the "first sample."
   6. If YY percent of the units in the first sample fail, test another XX percent of the remaining identical units.
   7. If YY percent of the units in the second sample fail, test all remaining identical units.
   8. If frequent failures occur, resulting in more troubleshooting than testing, the Commissioning Authority may stop the testing and require Contractor to perform and document a checkout of the remaining units prior to continuing testing.

D. Manual Testing: Use hand-held instruments, immediate control system readouts, or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the “observation”).

E. Simulating Conditions: Artificially create the necessary condition for the purpose of testing the response of a system; for example apply hot air to a space sensor using a hair dryer to see the response in a VAV box.

F. Simulating Signals: Disconnect the sensor and use a signal generator to send an amperage, resistance or pressure to the transducer and control system to simulate the sensor value.

G. Over-Writing Values: Change the sensor value known to the control system in the control system to see the response of the system; for example, change the outside air temperature value from 50 degrees F to 75 degrees F to verify economizer operation.

H. Indirect Indicators: Remote indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100 percent closed, are considered indirect indicators.

I. Monitoring: Record parameters (flow, current, status, pressure, etc.) of equipment operation using dataloggers or the trending capabilities of the relevant control systems; where monitoring of specific points is called for in Functional Test Procedures:
   1. All points that are monitored by the relevant control system shall be trended by Contractor; at the Commissioning Authority’s request, Contractor shall trend up to 20 percent more points than specified at no extra charge.
   2. Other points will be monitored by the Commissioning Authority using dataloggers.
   3. At the option of the Commissioning Authority, some control system monitoring may be replaced with datalogger monitoring.
   4. Provide hard copies of monitored data in columnar format with time down left column and at least 5 columns of point values on same page.
   5. Graphical output is desirable and is required for all output if the system can produce it.
   6. Monitoring may be used to augment manual testing.

3.07 OPERATION AND MAINTENANCE MANUALS

A. Add design intent documentation furnished by Engineer to manuals prior to submission to Owner.
B. Submit manuals related to items that were commissioned to Commissioning Authority for review; make changes recommended by Commissioning Authority.
C. Commissioning Authority will add commissioning records to manuals after submission to Owner.

3.08 TRAINING OF USING AGENCY PERSONNEL

A. The Contractor shall be responsible for training coordination and scheduling and ultimately for ensuring that training is completed.
B. The CxA shall be responsible for overseeing and approving the content and adequacy of the training of Using Agency personnel for commissioned equipment.
    1. The CxA shall interview the facility manager and lead engineer to determine the special needs and areas where training will be most valuable. The Using Agency and CxA shall decide how rigorous the training should be for each piece of commissioned equipment. The CxA shall communicate the results to the Subs and vendors who have training responsibilities.
        a. In addition to these general requirements, the specific training requirements of Using Agency personnel by Subcontractors and vendors is specified in Division 22, 23, and 26.
    2. Each Subcontractor and vendor responsible for training will submit a written training plan to the CxA for review and approval prior to training. The plan will cover the following elements:
        a. Equipment (included in training)
            1) Intended audience
            2) Location of training
            3) Objectives
            4) Subjects covered (description, duration of discussion, special methods, etc.)
            5) Duration of training on each subject
            6) Instructor for each subject
            7) Methods (classroom lecture, video, site walk-through, actual operational demonstrations, written handouts, etc.)
            8) Instructor and qualifications
            9) For the primary HVAC equipment, the contractor shall provide a short discussion of the control of the equipment during the mechanical or electrical training conducted by others.
        b. The CxA develops an overall training plan and coordinates and schedules, with the CM and GC, the overall training for the commissioned systems. The CxA develops criteria for determining that the training was satisfactorily completed, including attending some of the training, etc. The CxA recommends approval of the training to the CM using a standard form. The CM also signs the approval form at one of the training sessions, the CxA presents a one hour presentation discussing the use of the blank functional test forms for re-commissioning equipment. Video recording of the

training sessions will be provided by the Trade Contractor with media cataloged by the CxA and added to the O&M manuals.

3. The design engineer shall at the first training session present the overall system design concept and the design concept of each equipment section. This presentation shall be one to two hours in length and include a review of all systems using the simplified system schematics (one-line drawings) including chilled water systems, condenser water or heat rejection systems, heating systems, fuel oil and gas supply systems, supply air systems, exhaust system and outside air strategies.
4. Training Sessions
    a. Training shall be performed in a two phase process occurring at the same training session. The first step will be performed in the classroom with the contractor or equipment manufacturer providing a Power Point presentation on the overall functioning and maintenance required of the representative system. Actual photos of the each represented piece of equipment as well as O&M manuals shall be reviewed in the presentation. The second step of the training will be a tour of the building showing the specific equipment. It shall be noted that all training sessions will be videotaped there will be no exceptions or exclusions.

END OF SECTION

SECTION 210010 - BASIC FIRE PROTECTION REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this and all other sections in this Division.

1.02 WORK INCLUDES

A. Scope: Provide the basic items, articles, materials, operations, and methods required by the Drawings and Specifications, including labor, equipment, supplies, and incidentals necessary for completion of Fire Protection work.

B. Drawings: The Drawings show the general arrangement of equipment, but due to their small scale are essentially diagrammatic and do not detail every point at which conflicts of construction may occur. Should conditions necessitate any deviation from the general layout shown on the Drawings or if such deviations are more advantageous, the Contractor shall submit Drawings to the Architect for review showing the proposed method of installation. If such changes are accepted, they shall become part of the Contract to which it is applied.

1.03 SCOPE OF WORK

A. The Contractor shall be solely responsible to arrange for, obtain and bear the cost of necessary permits, bonds and fees for the automatic sprinkler work.

B. Furnish and install fire protection system where shown on the Drawings. The system shall include all piping, hangers, sprinkler heads, valves, controls, drains and alarms.

C. Provide testing of all piping and Work in full conformance with all applicable sections of NFPA 13.

D. Provide complete shop drawings with hydraulic calculations to the Architect and to the Fire Protection Authority Having Jurisdiction.

E. Provide certificates of inspection to the Architect for review upon completion of the Work.

F. Furnish and install all equipment and devices as shown on Drawings.

G. Periodically remove from the job site, all rubbish or debris resulting from the fire protection work.

H. Provide all other equipment and devices shown on the Drawings. This shall include all ancillary devices, wiring and associated components for the proper operation of all equipment installed or affected by this Project.

1.04 STANDARDS AND REGULATIONS

A. The work under the mechanical sections shall comply with the latest edition of the applicable standards and codes of the following:

1. ASME-American Society of Mechanical Engineers
2. ASHRAE-American Society of Heating, Refrigeration and Air Conditioning Engineers
3. ARI-Air Conditioning and Refrigeration Institute
4. ASTM-American Society for Testing Materials
5. ASA-American Standards Association
6. AWWA-American Water Works Association
7. NBFU-National Board of Fire Underwriters

8. AMCA-Air Moving and Conditioning Association
9. IBR-Institute of Boiler and Radiator Manufacturers
10. UL-Underwriters' Laboratories
11. NEMA-National Electric Manufacturers Association
12. NFPA #101-Current Edition Life Safety code
13. National Building Code
14. Illinois State Plumbing Code
15. Illinois Rules & Regulations for Fire Prevention and Safety
16. National, State and Local Building Codes
17. International Building Code
18. NFPA 13

B. Include all items of Labor and Material required to comply with such codes in accordance with Section "GENERAL CONDITIONS" Standards and Regulations, Article "Permits, Laws and Regulations". Where quantities, sizes or other requirements indicated on the drawings or herein specified are in excess of the Code requirements, the Specifications and/or Drawings shall govern regardless of the Code requirements.

1.05 SHOP DRAWINGS

A. Submit the following shop drawings and data sheets to the Architect for review.
1. Manufacturer's Drawings and performance data on all equipment.
2. Provide minimum 1/8" = 1'-0" scale Shop Drawings for all piping systems.
3. Dimensioned Drawings showing all required openings.
4. Dimensioned Drawings of all equipment rooms, including exact equipment locations.
5. Provide installation elevations for all equipment, piping, etc.
6. Additional Shop Drawing requirements may be found in other section of this Specification.

B. The Contractor shall be responsible for all equipment fitting into the spaces allocated on the plans for such equipment. This shall include any Work required to move the equipment to the spaces shown on the Drawings.

C. When Shop Drawings are resubmitted after having been returned for correction, only the changes noted on the previously reviewed Drawings will be checked by the Architect on the resubmitted shop drawings. If additional changes, other than those previously noted, are made on the resubmitted Drawings, the Contractor shall notify the Architect in writing of such additional changes.

D. Any materials installed prior to shop drawing review will be considered a mock up and may be changed without additional cost at the Architect's direction.

1.06 "RECORD" DRAWINGS

A. At the completion of the work, the Contractor shall provide to the Architect complete drawings pertaining to the Work, showing all equipment, pipe, ducts, outlets, etc., as actually installed with accurate dimensions locating all runs and branches. The Drawings shall be in electronic format -Autocad version 14 or newer and are not to be hand drawn on copies of the original Contract Drawings. Drawings are to be furnished as a minimum of (2) black line plots along with a CD-ROM with electronic drawing files.

1.07 COOPERATION BETWEEN TRADES

A. Each Subcontractor shall cooperate with all other Subcontractors. Each Subcontractor shall check, prior to commencement of work, for space requirements with all other Subcontractors Relocation of ducts, piping, etc., which may alter the architectural or structural construction must be reviewed by the Architect prior to relocation. No extra compensation will be allowed for Work resulting from these changes.

1.08 CARTING AND HANDLING

A. The Contractor shall furnish his own carting, handling and erecting of equipment and/or material included in this Contract.

1.09 DRAWINGS

A. The Drawings and details shall be taken as a diagrammatic means of installing piping, ductwork and other equipment. They are not intended to show every fitting and offset, nor every structural, electrical, piping or ductwork conflict that may be encountered during the installation of the Work. The Contractor shall be responsible to provide all additional duct or pipe fittings required to install the Work shown on the Drawings.

B. Consult all other Drawings included as part of this Project. The Drawings show the general arrangement of all piping, conduit and equipment. Examine the Drawings and Specifications carefully and notify the Architect by letter of any discrepancies so same can be rectified at the earliest possible date. The Contractor shall follow the Drawings as closely as possible for installation of all piping, ductwork and equipment.

C. The Contractor shall coordinate his work with all architectural, structural, electrical and mechanical features of the building.

D. Should conditions necessitate any rearrangement of piping, ductwork or equipment, or if same can be run to better advantage, the Contractor shall prepare and submit Drawings showing the changes before proceeding with the Work. If such changes are accepted, they shall become a part of this Contract after their approval.

E. Due to the small scale of the Drawings, it is not possible to show all offsets, and detail every point at which exigencies of construction may require special attention. Additional fittings, valves, traps, vacuum breakers, ducts, and other appurtenances necessary due to field conditions or Code requirements shall be furnished and installed by the Contractor at no additional cost to the Owner.

1.10 SITE AND JOB CONDITIONS

A. The Contractor shall review all other Drawings and coordinate the Work with same. No additional compensation shall be allowed for changes to adapt Work to coordinate with Work shown on other Drawings.

B. All dimensions, locations of equipment and connections to external utilities shall be reviewed in field prior to construction. The Architectural plans will hold precedence over mechanical plans as to location of partitions, etc. All construction dimensions shall be coordinated with the Architectural Drawings where discrepancies may exist.

1.11 MODIFICATIONS TO EXISTING EQUIPMENT

A. All existing equipment affected by this Project shall be treated as new.

B. The Contractor shall be responsible to provide new hangers for all existing equipment and piping to remain.

C. Existing hangers may remain if the insulation and hangers comply fully with all provisions of the Project Manual and Contract Drawings.

1.12 INSTALLATION OF EQUIPMENT

A. The Contractor shall be responsible to install all equipment as per the Manufacturer's written recommendations.

B. Due to the small scale of the drawings, not all devices and appurtenances can be shown on the Contract Documents. The Contractor shall include all devices, piping, wiring and other equipment required for a fully functional installation.

C. The Contractor shall be responsible to provide piping diagrams and all other required site specific information to the Equipment Manufacturer for review prior to installation of the equipment or any of the associated piping or devices.

D. All devices requiring service shall be installed in accessible locations. Access shall be provided at all control valves, isolation valves, control devices and panels, damper operators and motors. All such devices installed above suspended acoustical ceilings with removable pads shall be oriented such that the Manufacturer's recommended clearances are met. The Contractor shall provide access panels at all devices installed above all other ceilings, behind casework and in all other inaccessible locations. The minimum size of the access panels shall be 18"x18". Access panels shall be fire rated where installed in fire rated construction. Color of panels shall be as selected by the Architect.

E. The Contractor shall be responsible to provide all modifications to all equipment required to connect the equipment to the required electrical feeds. These modifications shall include, but shall not be limited to, replacement of wiring lugs required to fit power or control wiring and the installation of additional wiring or conduits.

F. Any modifications to the Work shown on the Contract Documents (including, but not limited to, additional devices, modifications to electrical feeds or modifications to piping sizes) required by the Equipment Manufacturer shall be provided by the Contractor. No additional compensation will be allowed for any modifications required by the Manufacturer for a fully functional installation.

1.13 FLOOR AND WALL PENETRATIONS

A. All floor and wall penetrations for all equipment including ductwork, piping, conduit, etc. shall be sealed. Sealant used shall be applied to both sides of penetration.

B. Rating of sealant used shall meet or exceed the UL fire rating of the floor or wall assembly.

C. Sealants shall remain flexible throughout the entire temperature and expansion range of the affected system.

D. All sealants used shall be fully plenum rated and shall have a flame spread rating of less than 25 and a smoke developed rating of not more than 50.

E. Insulation, where applied, shall be continuous through wall or floor penetration. Insulation thickness and vapor barrier integrity shall also remain continuous through penetration.

1.14 ACCEPTABLE BASE BID MANUFACTURERS

A. The Contract Documents have been prepared for the installation of the equipment scheduled on the Drawings. Acceptable Base Bid Manufacturers have been included in the Project Manual.

B. The Contractor shall be responsible to provide all modifications to the Work shown on the Drawings required for the installation of equipment provided by the Acceptable Base Bid Manufacturers. These modifications shall include, but shall not be limited to, electrical feeds, pipe sizes, support structure, etc.

C. All required modifications shall be coordinated by the Contractor prior to submitting the Bid. No additional compensation shall be allowed for any changes to the Work shown on the Drawings required for any equipment provided by an Acceptable Base Bid Manufacturer.

1.15 PROTECTION

A. The Contractor shall keep all pipe openings closed by means of plugs or caps to prevent entrance of foreign matter and shall cover all fixtures, equipment and apparatus as required to protect them against dirt, water, chemical or mechanical damage before, during and after installation. Any such fixtures, equipment or apparatus damaged prior to final acceptance of the Work shall be restored to its original condition or replaced by the Contractor.

1.16 JURISDICTION OF WORK

A. Whenever it becomes necessary for a Subcontractor to furnish Labor and Materials other than that which is generally accepted by trade agreement or general practices to belong to his particular trade or branch of work, he shall Subcontract such work or branch of work involved.

B. However, if there is an overlapping of trades, practices or trade agreements and a jurisdictional dispute arises to claims of tradesmen of another Subcontractor, and a trade union settlement is made in favor of these tradesmen who claimed the work, he shall perform it at his own expense as if it has been included in his Work. All such Work shall be executed in such a manner that there will be no delay or stoppage of work due to infringement or alleged infringement of trade agreements as to jurisdiction.

1.17 CLEANING

A. The Contractor shall clean premises of all excess construction material and debris caused by the Work at the completion of the Work or at the direction of the Owner, Architect or Owner's agent during the course of the Project. All equipment provided by the Contractor shall be thoroughly washed down prior award of Substantial Completion.

1.18 WARRANTY

A. All work shall be guaranteed for two years after Substantial Completion and final acceptance against all defects of material, equipment and workmanship. All defects appearing within two years shall be promptly remedied without further cost to the Owner.

B. All equipment shall be guaranteed to meet specified capacities and to operate within limits of noise level and vibration recommended in the current issue of the ASHRAE Guide and Data Book.

C. Any portion or the work performed by the Contractor that fails within the warranty period shall be repaired or replaced by the Contractor without additional cost to the Owner.

D. Additional specific warranties may be found in other sections of this Specification.

END OF SECTION

SECTION 210500 - COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Above ground piping.
B. Escutcheons.
C. Mechanical couplings.
D. Pipe hangers and supports.
E. Pipe sleeves.

1.02 RELATED REQUIREMENTS

A. Section 210523 - General-Duty Valves for Water-Based Fire-Suppression Piping.
B. Section 210553 - Identification for Fire Suppression Piping and Equipment: Piping identification.
C. Section 211200 - Fire-Suppression Standpipes: Standpipe design.
D. Section 211300 - Fire-Suppression Sprinkler Systems: Sprinkler systems design.

1.03 REFERENCE STANDARDS

A. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators; 2023.
B. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2020.
C. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2021.
D. ASME B16.4 - Gray Iron Threaded Fittings: Classes 125 and 250; 2021.
E. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard; 2020.
F. ASME B16.9 - Factory-Made Wrought Buttwelding Fittings; 2018.
G. ASME B16.11 - Forged Fittings, Socket-Welding and Threaded; 2021.
H. ASME B16.25 - Buttwelding Ends; 2017.
I. ASME B36.10M - Welded and Seamless Wrought Steel Pipe; 2018.
J. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999, with Editorial Revision (2022).
K. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.
L. ASTM A135/A135M - Standard Specification for Electric-Resistance-Welded Steel Pipe; 2021.
M. ASTM A536 - Standard Specification for Ductile Iron Castings; 1984, with Editorial Revision (2019).
N. ASTM A795/A795M - Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use; 2021.
O. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017).
P. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2022).
Q. AWWA C606 - Grooved and Shouldered Joints; 2022.
R. ITS (DIR) - Directory of Listed Products; Current Edition.

S. NFPA 13 - Standard for the Installation of Sprinkler Systems; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
T. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems; 2019, with Amendment.

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's catalog information. Indicate valve data and ratings.
B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, and floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.
C. Project Record Documents: Record actual locations of components and tag numbering.
D. Operation and Maintenance Data: Include installation instructions and spare parts lists.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
B. Installer Qualifications: Company specializing in performing work of the type specified in this section.
   1. Minimum three years experience.
C. Conform to UL and FM requirements.
D. Valves: Bear FM and UL (DIR) product listing label or marking. Provide manufacturer's name and pressure rating marked on valve body.
E. Products Requiring Electrical Connection: Listed and classified as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store valves in shipping containers, with labeling in place.
B. Provide temporary protective coating on cast iron and steel valves.
C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Sprinkler-based System:
   1. Comply with NFPA 13.
   2. See Section 211300.
B. Welding Materials and Procedures: Comply with ASME BPVC-IX.
C. Provide system pipes, fittings, sleeves, escutcheons, seals, and other related accessories.

2.02 ABOVE GROUND PIPING

A. Steel Pipe: ASTM A795 Schedule 10 or ASTM A795 Schedule 40, black.
   1. Cast Iron Fittings: ASME B16.1, flanges and flanged fittings and ASME B16.4, threaded fittings.
   2. Malleable Iron Fittings: ASME B16.3, threaded fittings and ASTM A47/A47M.

3. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.

2.03 PIPE SLEEVES

A. Vertical Piping:
   1. Sleeve Length: 1 inch above finished floor.
   2. Provide sealant for watertight joint.
   3. Blocked Out Floor Openings: Provide 1-1/2 inch angle set in silicon adhesive around opening.
   4. Drilled Penetrations: Provide 1-1/2 inch angle ring or square set in silicone adhesive around penetration.
B. Plastic, Sheet Metal, or Moisture-Resistant Fiber: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.
C. Clearances:
   1. Provide allowance for insulated piping.
   2. Wall, Floor, Floor, Partitions, and Beam Flanges: 1 inch greater than external; pipe diameter.
   3. Rated Openings: Caulked tight with firestopping material complying with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.

2.04 ESCUTCHEONS

A. Manufacturers:
   1. Fire Protection Products, Inc: www.fppi.com.com.
   2. Viking Group Inc: www.vikinggroupinc.com.
B. Material:
   1. Fabricate from nonferrous metal.
   2. Chrome-plated.
   3. Metals and Finish: Comply with ASME A112.18.1.
C. Construction:
   1. One-piece for mounting on chrome-plated tubing or pipe and one-piece or split-pattern type elsewhere.
   2. Internal spring tension devices or setscrews to maintain a fixed position against a surface.

2.05 PIPE HANGERS AND SUPPORTS

A. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
B. Hangers for Pipe Sizes 1/2 to 6 inch: Steel loop hanger
   1. Conform with Federal Specification WW-H-171 (Type 10), Manufacturers Standardization Society (MSS) SP-58 (Type 10)
C. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
D. Wall Support for Pipe Sizes to 3 inches: Cast iron hook.
E. Wall Support for Pipe Sizes 4 inches and Over: Welded steel bracket and wrought steel clamp.
F. Vertical Support: Steel riser clamp.

2.06 MECHANICAL COUPLINGS

A. Rigid Mechanical Couplings for Grooved Joints:

1. Dimensions and Testing: Comply with AWWA C606.
2. Minimum Working Pressure: 300 psig.
3. Housing Material: Fabricate of ductile iron complying with ASTM A536.
4. Housing Coating: Factory applied orange enamel.
5. Gasket Material: EPDM suitable for operating temperature range from minus 30 degrees F to 230 degrees F.
6. Bolts and Nuts: Hot-dipped-galvanized or zinc-electroplated steel.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
B. Remove scale and foreign material, from inside and outside, before assembly.
C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

A. Install sprinkler system and service main piping, hangers, and supports in accordance with NFPA 13.
B. Install standpipe piping, hangers, and supports in accordance with NFPA 14.
C. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
D. Install piping to conserve building space, to not interfere with use of space and other work.
E. Group piping whenever practical at common elevations.
F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
G. Inserts:
   1. Provide inserts for placement in concrete formwork.
   2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
   3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
   4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
   5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
H. Pipe Hangers and Supports:
   1. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
   2. Place hangers within 12 inches of each horizontal elbow.
   3. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
   4. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
   5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
I. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.

J. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welding.

K. Do not penetrate building structural members unless indicated.

L. Provide sleeves when penetrating footings, floors, walls, and partitions and seal pipe and sleeve penetrations to achieve fire resistance equivalent to fire separation required.
   1. Aboveground Piping:
      a. Pack solid using mineral fiber complying with ASTM C592.
      b. Fill space with an elastomer caulk to a depth of 0.50 inch where penetrations occur between conditioned and unconditioned spaces.
   2. All Rated Openings: Caulk tight with firestopping material complying with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.
   3. Caulk exterior wall sleeves watertight with lead and oakum or mechanically expandable chloroprene inserts with mastic-sealed components.

M. Escutcheons:
   1. Install and firmly attach escutcheons at piping penetrations into finished spaces.
   2. Provide escutcheons on both sides of partitions separating finished areas through which piping passes.
   3. Attach plates at the underside only of suspended ceilings.
   4. Use chrome plated escutcheons in occupied spaces and to conceal openings in construction.

N. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, unions, and couplings for servicing are consistently provided.

O. Die cut threaded joints with full cut standard taper pipe threads with PTFE joint compound applied to male threads only.

3.03 SCHEDULES

A. Hanger Spacing for Steel Piping.
   1. 1/2 inch, 3/4 inch, and 1 inch: Maximum span, 7 feet; minimum rod size, 1/4 inch
   2. 1-1/4 inches: Maximum span, 8 feet; minimum rod size, 3/8 inch
   3. 1-1/2 inches: Maximum span, 9 feet; minimum rod size, 3/8 inch
   4. 2 inches: Maximum span, 10 feet; minimum rod size, 3/8 inch
   5. 2-1/2 inches: Maximum span, 10 feet; minimum rod size, 3/8 inch
   6. 3 inches: Maximum span, 10 feet; minimum rod size, 3/8 inch
   7. 4 inches: Maximum span, 10 feet; minimum rod size, 1/2 inch
   8. 6 inches: Maximum span, 10 feet; minimum rod size, 1/2 inch.

B. Piping.
   1. 1.5" and smaller: Schedule 40
   2. 2" and larger: Schedule 10

3.04 CLEANING

A. Upon completion of work, clean all parts of the installation.

B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

END OF SECTION

SECTION 210523 - GENERAL-DUTY VALVES FOR WATER-BASED FIRE-SUPPRESSION PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Trim and drain valves.

1.02 RELATED REQUIREMENTS

A. Section 210500 - Common Work Results for Fire Suppression: Pipe and fittings.
B. Section 210553 - Identification for Fire Suppression Piping and Equipment.
C. Section 211200 - Fire-Suppression Standpipes.
D. Section 211300 - Fire-Suppression Sprinkler Systems.
E. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 ABBREVIATIONS AND ACRONYMS

A. EPDM: Ethylene-propylene diene monomer.
B. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
C. NRS: Non-rising stem.
D. OS&Y: Outside screw and yoke.
E. PTFE: Polytetrafluoroethylene.
F. SBR: Styrene-butadiene rubber.

1.04 REFERENCE STANDARDS

A. ASME B1.20.1 - Pipe Threads, General Purpose, Inch; 2013 (Reaffirmed 2018).
B. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2020.
C. ASME B31.9 - Building Services Piping; 2020.
D. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators; 2023.
E. AWWA C606 - Grooved and Shouldered Joints; 2022.
F. FM (AG) - FM Approval Guide; Current Edition.
G. UL (DIR) - Online Certifications Directory; Current Edition.
H. UL 262 - Gate Valves for Fire-Protection Service; Current Edition, Including All Revisions.
I. UL 312 - Check Valves for Fire-Protection Service; Current Edition, Including All Revisions.

1.05 SUBMITTALS

A. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
B. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
C. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. Obtain valves for each valve type from single manufacturer.
   2. Company must specialize in manufacturing products specified in this section, with not less than three years of documented experience.
B. Where listed products are specified, provide products listed, classified, and labeled by FM (AG), UL (DIR), or testing firm acceptable to authorities having jurisdiction as suitable for the purpose indicated.
C. Welding Materials and Procedures: Comply with ASME BPVC-IX.
D. Installer Qualifications:
   1. Company specializing in performing the work of this section with minimum five years documented experience.
   2. Trained and approved by manufacturer to design, install, test and maintain the equipment specified herein.
   3. Complies with manufacturer's certification requirements.
   4. Complies with manufacturer's insurance requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:
   1. Protect internal parts against rust and corrosion.
   2. Protect threads and flange faces.
   3. Set valves open to minimize exposure of functional surfaces.
B. Use the following precautions during storage:
   1. Maintain valve end protection and protect flanges and specialties from dirt.
      a. Provide temporary inlet and outlet caps.
      b. Maintain caps in place until installation.
   2. Store valves in shipping containers and maintain in place until installation.
      a. Store valves indoors and maintain at higher than ambient dew point temperature.
      b. If outdoor storage is unavoidable, store valves off the ground in watertight enclosures.
C. Use the following precautions for handling:
   1. Use sling to handle large valves, rigged to avoid damage to exposed parts.
   2. Do not use operating handles or stems as lifting or rigging points.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. UL Listed: Provide valves listed in UL (DIR) under following headings and bearing UL mark:
   1. Main Level: HAMV - Fire Main Equipment.
      a. Level 1: HCBZ - Indicator Posts, Gate Valve.
      b. Level 1: HLOT - Valves.
      c. Level 3: HLUG - Ball Valves, System Control.
      d. Level 3: HLXS - Butterfly Valves.
      e. Level 3: HMER - Check Valves.
      f. Level 3: HMRZ - Gate Valves.

2. Main Level: VDGT - Sprinkler System & Water Spray System Devices.
    a. Level 1: VQGU - Valves, Trim, and Drain.

B. FM Global Approved: Provide valves listed in FM (AG) Approval Guide under the following headings:
1. Automated Sprinkler Systems:
    a. Valves:
        1) Gate valves.
        2) Single check valves.
        3) Miscellaneous valves.

C. ASME Compliance:
1. ASME B16.1 for flanges on iron valves.
2. ASME B1.20.1 for threads on threaded-end valves.
3. ASME B31.9 for building services piping valves.

D. Comply with AWWA C606 for grooved-end connections.

E. Valve Pressure Ratings: Not less than minimum pressure rating indicated or higher as required.

F. Valve Sizes: Same as upstream piping unless otherwise indicated.

G. Valve Actuator Types:
1. Worm-gear actuator with handwheel for quarter-turn valves, except trim and drain valves.
2. Handwheel: For other than quarter-turn trim and drain valves.
3. Hand-lever: For quarter-turn trim and drain valves 2 NPS and smaller.

2.02 TRIM AND DRAIN VALVES

A. Ball Valves:
1. Description:
    a. Pressure Rating: 175 psig.
    b. Body Design: Two piece.
    c. Body Material: Forged brass or bronze.
    d. Port Size: Full or standard.
    e. Seat: PTFE.
    f. Stem: Bronze or stainless steel.
    g. Ball: Chrome-plated brass.
    h. Actuator: Hand-lever.
    i. End Connections for Valves 1 NPS through 2-1/2 NPS: Threaded ends.
    j. End Connections for Valves 1-1/4 NPS and 2-1/2 NPS: Grooved ends.

B. Angle Valves:
1. Description:
    a. Pressure Rating: 175 psig.
    b. Body Material: Brass or bronze.
    c. Ends: Threaded.
    d. Stem: Bronze.
    e. Disc: Bronze.
    f. Packing: Asbestos free.
    g. Handwheel: Malleable iron, bronze, or aluminum.

C. Globe Valves:

1. Description:
    a. Pressure Rating: 175 psig.
    b. Body Material: Bronze with integral seat and screw-in bonnet.
    c. Ends: Threaded.
    d. Stem: Bronze.
    e. Disc Holder and Nut: Bronze.
    f. Disc Seat: Nitrile.
    g. Packing: Asbestos free.
    h. Handwheel: Malleable iron, bronze, or aluminum.

PART 3 EXECUTION

3.01 EXAMINATION

A. Confirm valve interior to be free of foreign matter and corrosion.
B. Remove packing materials.
C. Examine guides and seats by operating valves from the fully open position to the fully closed position.
D. Examine valve threads and mating pipe for form and cleanliness.
E. Examine mating flange faces for conditions that might cause leakage.
    1. Check bolting for proper size, length, and material.
    2. Verify gasket for size, defects, damage, and suitable material composition for service.
    3. Replace all defective valves with new valves.

3.02 INSTALLATION

A. Comply with specific valve installation requirements and application in the following Sections:
    1. Section 211200 for application of valves in fire-suppression standpipes.
    2. Section 211300 for application of valves in wet and dry pipe, fire-suppression sprinkler systems.
B. Install listed fire protection shutoff valves supervised-open, located to control sources of water supply except from fire department connections.
    1. Install permanent identification signs indicating portion of system controlled by each valve.
C. Install check valve in water supply connections and backflow preventer at potable water supply connections.
D. Valves with threaded connections to have unions at equipment arranged for easy access, service, maintenance, and equipment removal without system shutdown.
E. Valves in horizontal piping installed with stem at or above the pipe center.
F. Position valves to allow full stem movement.
G. Install valve tags. Comply with Section 210553 requirements for valve tags, schedules, and signs on surfaces concealing valves; and the appropriate NFPA standard applying to the piping system in which valves are installed.

END OF SECTION

SECTION 210553 - IDENTIFICATION FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.
B. Tags.
C. Pipe markers.

1.02 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2020.
B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2017.

1.03 SUBMITTALS

A. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
B. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
C. Product Data: Provide manufacturers catalog literature for each product required.
D. Manufacturer's Installation Instructions: Indicate special procedures, and installation instructions.
E. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. Automatic Controls: Tags.
B. Control Panels: Nameplates.
C. Instrumentation: Tags.
D. Major Control Components: Nameplates.
E. Piping: Pipe markers.
F. Pumps: Nameplates.
G. Relays: Tags.
H. Small-sized Equipment: Tags.
I. Valves: Tags and ceiling tacks where above lay-in ceilings.

2.02 NAMEPLATES

A. Manufacturers:
    1. Brimar Industries, Inc.: www.pipemarker.com.
    2. Kolbi Pipe Marker Company.: www.kolbipipemarkers.com.
    3. Seton Identification Products, a Tricor Direct Company: www.seton.com.
B. Description: Laminated three-layer plastic with engraved letters.
    1. Letter Color: White.
    2. Letter Height: 1/4 inch.
    3. Background Color: Black.

4. Thickness: 1/8 inch.
5. Plastic: Comply with ASTM D709.

2.03 TAGS

A. Manufacturers:
   1. Advanced Graphic Engraving, LLC: www.advancedgraphicengraving.com.
   2. Brady Corporation: www.bradycorp.com.
   3. Brimar Industries, Inc.: www.pipemarker.com.
   4. Kolbi Pipe Marker Company.: www.kolbipipemarkers.com.
   5. Seton Identification Products, a Tricor Direct Company: www.seton.com.
B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
C. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.04 PIPE MARKERS

A. Manufacturers:
   1. Brady Corporation: www.bradycorp.com.
   2. Brimar Industries, Inc.: www.pipemarker.com.
   3. Kolbi Pipe Marker Company.: www.kolbipipemarkers.com.
   4. Seton Identification Products, a Tricor Company: www.seton.com.
B. Color: Comply with ASME A13.1.
C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure-sensitive adhesive backing and printed markings.
D. Color code as follows:
   1. Fire Quenching Fluids: Red with white letters.

2.05 CEILING TACKS

A. Description: Steel with 3/4 inch diameter color coded head.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
B. Install tags with corrosion resistant chain.
C. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
D. Use tags on piping 3/4 inch diameter and smaller.
   1. Identify service, flow direction, and pressure.
   2. Install in clear view and align with axis of piping.
   3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

E. Locate ceiling tacks to locate valves above T-bar type panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

SECTION 211300 - FIRE-SUPPRESSION SPRINKLER SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wet-pipe sprinkler system.
B. System design, installation, and certification.

1.02 RELATED REQUIREMENTS

A. Section 210500 - Common Work Results for Fire Suppression: Pipe and fittings.
B. Section 210523 - General-Duty Valves for Water-Based Fire-Suppression Piping.
C. Section 210553 - Identification for Fire Suppression Piping and Equipment.
D. Section 211200 - Fire-Suppression Standpipes.
E. Section 213000 - Fire Pumps.
F. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. NFPA 13 - Standard for the Installation of Sprinkler Systems; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
B. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 SUBMITTALS

A. Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
B. Shop Drawings:
   1. Submit preliminary layout of finished ceiling areas indicating only sprinkler locations coordinated with ceiling installation.
   2. Indicate hydraulic calculations, detailed pipe layout, hangers and supports, sprinklers, components, and accessories. Indicate system controls.
   3. Submit shop drawings to Authorities Having Jurisdiction for approval. Submit proof of approval to Engineer.
C. Manufacturer's Certificate: Certify that system has been tested and meets or exceeds specified requirements and code requirements.
D. Operation and Maintenance Data: Include components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.
E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Extra Sprinklers: Type and size matching those installed in quantity required by referenced NFPA design and installation standard.
   2. Sprinkler Wrenches: For each sprinkler type.
F. Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.

1.05 QUALITY ASSURANCE

A. Maintain one copy of referenced design and installation standard on site.

B. Comply with FM (AG) requirements.
C. Designer Qualifications: Design system under direct supervision of a Professional Fire Protection Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
D. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
E. Installer Qualifications: Company specializing in performing the work of this section with minimum three years experience and approved by manufacturer.
F. Equipment and Components: Provide products that bear {\rs\#1} label or marking.
G. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Sprinklers, Valves, and Equipment:
1. Globe Corporation globesprinkler.com
2. Tyco Fire Protection Products, a Tyco Business: www.tyco-fire.com.
3. Viking Corporation: www.vikinggroupinc.com.

2.02 SPRINKLER SYSTEM

A. Sprinkler System: Provide coverage for entire building.
B. Occupancy: Light hazard; comply with NFPA 13.
C. Water Supply: Determine volume and pressure from water flow test data.
1. Revise design when test data available prior to submittals.
D. Storage Cabinet for Spare Sprinklers and Tools: Steel, located adjacent to alarm valve.

2.03 SPRINKLERS

A. Suspended Ceiling Type: Concealed pendant type with matching push on cover plate.
1. Response Type: Quick.
2. Coverage Type: Standard.
3. Finish: Enamel, color as selected.
4. Escutcheon Plate Finish: Enamel, color as selected.
5. Fusible Link: Glass bulb type temperature rated for specific area hazard.
B. Exposed Area Type: Upright type with guard.
1. Response Type: Quick.
2. Coverage Type: Standard.
3. Finish: Brass.
4. Fusible Link: Glass bulb type temperature rated for specific area hazard.
C. Sidewall Type: Semi-recessed horizontal sidewall type with matching push on escutcheon plate.
1. Response Type: Quick.

2. Coverage Type: Standard.
3. Finish: Chrome plated.
4. Escutcheon Plate Finish: Chrome plated.
5. Fusible Link: Glass bulb type temperature rated for specific area hazard.

D. Dry Sprinklers: Concealed pendant type with matching push on cover plate.
1. Response Type: Quick.
2. Coverage Type: Standard.
3. Finish: Enamel, color as selected.
4. Cover Plate Finish: Enamel, color as selected.
5. Fusible Link: Glass bulb type temperature rated for specific area hazard.

E. Guards: Finish to match sprinkler finish.

F. Flexible Drop System: Stainless steel, multiple use, open gate type.
1. Manufacturers:
a. Victaulic Company; Vic-Flex: www.victaulic.com/#sle.
b. FlexHead Industries, Inc.:www.flexhead.com.
2. Description:
a. Flexible Sprinkler Hose Fittings for use in commercial suspended ceilings and sheetrock ceilings.
b. Regulatory Requirements: In accordance with NFPA 13.
3. Product Performance Criteria:
a. FM Approved for its intended use pursuant to FM 1637 Approval Standard for Flexible Sprinkler Hose with Threaded End Fittings.
b. UL Listed for its intended use pursuant to UL 2443 Standard for Flexible Sprinkler Hose with Fittings for Fire Protection Service.
c. Seismically qualified for use pursuant to ICC-ES AC-156 Acceptance Criteria for Seismic Qualification by Shake-Table Testing of Nonstructural Components and Systems.
4. Materials:
a. Hose Assemblies and End Fittings:
1) Composition: 100% Type 304 Stainless Steel.
2) Straight Hose Assemblies:
(a) 2 through 6 foot assembly lengths
(b) 1/2" or 3/4" outlets
(c) 175 psi rated pressure
(d) Fully welded non-mechanical fittings, braided, leak-tested with minimum 1 inch true-bore internal corrugated hose diameter.
3) Elbow Hose Assemblies (For use in confined spaces):
(a) 2 through 6 foot assembly lengths
(b) 1/2" or 3/4" outlets
(c) 175 psi rated pressure
(d) Fully welded non-mechanical fittings, braided, leak-tested with minimum 1 inch true-bore internal corrugated hose diameter.
b. Ceiling Bracket:
1) Composition: Type G90 Galvanized Steel.

2) Type: Direct attachment type, having integrated snap-on clip ends positively attached to the ceiling using tamper-resistant screws.
3) Flexible Hose Attachment: Removable hub type with set screw.

PART 3 EXECUTION

3.01 SYSTEM DESIGN

A. The Contractor shall be responsible for the final design of all system piping and components. All required equipment shall be included as part of this Project.
B. All zones shall be as indicated on the Drawings.
C. All piping, where shown on the Drawings, shall be installed as closely as possible to the locations shown.
D. No piping shall be installed in electrical rooms, elevator machine rooms, elevator hoistways and all other similar areas. Only piping feeding devices in these areas shall be allowed to be installed in these areas.
E. Provide dry type sprinkler heads in all locations requiring such heads. These locations shall include, but shall not be limited to, outside storage areas and walk-in freezers and coolers.
F. Provide all systems and components as shown on the Drawings and or required by NFPA 13. Provide dry pipe systems for all areas exposed to temperatures below 40 degrees F.
G. All mains shall be assumed to be 6" unless noted otherwise. Main pipe sizes may be reduced in size where justified by hydraulic calculations.

3.02 INSTALLATION

A. Install in accordance with referenced NFPA design and installation standard.
B. Install equipment in accordance with manufacturer's instructions.
C. Provide approved backflow preventer assembly at sprinkler system water source connection.
D. Locate fire department connection with sufficient clearance from walls, obstructions, or adjacent siamese connectors to allow full swing of fire department wrench handle. Coordinate the exact location and elevation of the fire department connection with the local fire department prior to installation.
E. Locate outside alarm gong on building wall adjacent to the fire department connection..
F. Place pipe runs to minimize obstruction to other work.
G. Place piping in concealed spaces above finished ceilings.
H. Center sprinklers in two directions in ceiling tile and provide piping offsets as required.
I. Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting. Replace painted sprinklers.
J. Flush entire piping system of foreign matter.
K. Install guards on sprinklers where indicated.
L. Hydrostatically test entire system.
M. Require test be witnessed by Fire Marshal.

3.03 INTERFACE WITH OTHER PRODUCTS

A. Ensure required devices are installed and connected as required to fire alarm system.

3.04 SCHEDULES

A. System Hazard Areas:
   1. Offices, classrooms, hallways, gymnasium and storage rooms: Light Hazard.
   2. Mechanical rooms: Ordinary Hazard, Group 2.

END OF SECTION

SECTION 220510 - BASIC PLUMBING REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this and all other sections in Division 22.

1.02 WORK INCLUDES

A. Scope: Provide the basic items, articles, materials, operations, and methods required by the Drawings and Specifications, including labor, equipment, supplies, and incidentals necessary for completion of Plumbing work.

B. Drawings: The Drawings show the general arrangement of equipment, but due to their small scale are essentially diagrammatic and do not detail every point at which conflicts of construction may occur. Should conditions necessitate any deviation from the general layout shown on the Drawings or if such deviations are more advantageous, the Contractor shall submit Drawings to the Architect for review showing the proposed method of installation. If such changes are accepted, they shall become part of the Contract to which it is applied.

1.03 SCOPE OF WORK

A. Provide a complete system of soil, waste, vent and drain piping to each and every fixture, device or appliance shown on any Drawing included as part of this Project.

B. Provide all domestic supply and return piping, valves, pipe coverings and insulation.

C. Provide all floor drains and cleanouts.

D. Provide all refrigerator wall boxes.

E. Provide thermostatic mixing valves at all locations shown on the Drawings.

F. Excavate and backfill as required for the installation of all new piping and equipment.

G. Provide all plumbing fixtures including wall hung flush valve water closets, urinals, wall hung lavatories, sinks, electric water coolers, and wall-hung lavatory units, complete with trim.

H. Provide all roof and floor openings, wall chases and openings, curbs, cant strips and structural steel supports where and as required, including wall openings in foundation walls.

I. Provide access panels to valves and cleanouts.

J. Provide heat trace and associated components.

K. Pressure test sanitary and domestic water systems

L. Chlorinate all domestic water systems.

M. Provide all other equipment and devices shown on the Drawings. This shall include all ancillary devices, wiring and associated components for the proper operation of all equipment installed or affected by this Project.

1.04 STANDARDS AND REGULATIONS

A. The work under the mechanical sections shall comply with the latest edition of the applicable standards and codes of the following:

1. ASME-American Society of Mechanical Engineers
2. ASHRAE-American Society of Heating, Refrigeration and Air Conditioning Engineers
3. ARI-Air Conditioning and Refrigeration Institute

4. ASTM-American Society for Testing Materials
5. ASA-American Standards Association
6. AWWA-American Water Works Association
7. NBFU-National Board of Fire Underwriters
8. AMCA-Air Moving and Conditioning Association
9. IBR-Institute of Boiler and Radiator Manufacturers
10. UL-Underwriters' Laboratories
11. NEMA-National Electric Manufacturers Association
12. NFPA #101-Current Edition Life Safety code
13. National Building Code
14. Illinois State Plumbing Code
15. Illinois Rules & Regulations for Fire Prevention and Safety
16. National, State and Local Building Codes
17. International Building Code

B. Include all items of Labor and Material required to comply with such codes in accordance with Section "GENERAL CONDITIONS" Standards and Regulations, Article "Permits, Laws and Regulations". Where quantities, sizes or other requirements indicated on the drawings or herein specified are in excess of the Code requirements, the Specifications and/or Drawings shall govern regardless of the Code requirements.

1.05 SHOP DRAWINGS

A. Submit the following shop drawings and data sheets to the Architect for review.
1. Manufacturer's Drawings and performance data on all equipment.
2. Provide minimum 1/8" = 1'-0" scale Shop Drawings for all piping systems.
3. Dimensioned Drawings showing all required openings.
4. Dimensioned Drawings of all equipment rooms, including exact equipment locations.
5. Provide installation elevations for all equipment, piping, etc.
6. Additional Shop Drawing requirements may be found in other section of this Specification.

B. The Contractor shall be responsible for all equipment fitting into the spaces allocated on the plans for such equipment. This shall include any Work required to move the equipment to the spaces shown on the Drawings.

C. When Shop Drawings are resubmitted after having been returned for correction, only the changes noted on the previously reviewed Drawings will be checked by the Architect on the resubmitted shop drawings. If additional changes, other than those previously noted, are made on the resubmitted Drawings, the Contractor shall notify the Architect in writing of such additional changes.

D. Any materials installed prior to shop drawing review will be considered a mock up and may be changed without additional cost at the Architect's direction.

1.06 "RECORD" DRAWINGS

A. At the completion of the work, the Contractor shall provide to the Architect complete drawings pertaining to the Work, showing all equipment, pipe, ducts, outlets, etc., as actually installed with accurate dimensions locating all runs and branches. The Drawings shall be in electronic format -Autocad version 14 or newer and are not to be hand drawn on copies of the original

Contract Drawings. Drawings are to be furnished as a minimum of (2) black line plots along with a CD-ROM with electronic drawing files.

1.07 COOPERATION BETWEEN TRADES

A. Each Subcontractor shall cooperate with all other Subcontractors. Each Subcontractor shall check, prior to commencement of work, for space requirements with all other Subcontractors Relocation of ducts, piping, etc., which may alter the architectural or structural construction must be reviewed by the Architect prior to relocation. No extra compensation will be allowed for Work resulting from these changes.

1.08 CARTING AND HANDLING

A. The Contractor shall furnish his own carting, handling and erecting of equipment and/or material included in this Contract.

1.09 DRAWINGS

A. The Drawings and details shall be taken as a diagrammatic means of installing piping, ductwork and other equipment. They are not intended to show every fitting and offset, nor every structural, electrical, piping or ductwork conflict that may be encountered during the installation of the Work. The Contractor shall be responsible to provide all additional duct or pipe fittings required to install the Work shown on the Drawings.

B. Consult all other Drawings included as part of this Project. The Drawings show the general arrangement of all piping, conduit and equipment. Examine the Drawings and Specifications carefully and notify the Architect by letter of any discrepancies so same can be rectified at the earliest possible date. The Contractor shall follow the Drawings as closely as possible for installation of all piping, ductwork and equipment.

C. The Contractor shall coordinate his work with all architectural, structural, electrical and mechanical features of the building.

D. Should conditions necessitate any rearrangement of piping, ductwork or equipment, or if same can be run to better advantage, the Contractor shall prepare and submit Drawings showing the changes before proceeding with the Work. If such changes are accepted, they shall become a part of this Contract after their approval.

E. Due to the small scale of the Drawings, it is not possible to show all offsets, and detail every point at which exigencies of construction may require special attention. Additional fittings, valves, traps, vacuum breakers, ducts, and other appurtenances necessary due to field conditions or Code requirements shall be furnished and installed by the Contractor at no additional cost to the Owner.

1.10 SITE AND JOB CONDITIONS

A. The Contractor shall review all other Drawings and coordinate the Work with same. No additional compensation shall be allowed for changes to adapt Work to coordinate with Work shown on other Drawings.

B. All dimensions, locations of equipment and connections to external utilities shall be reviewed in field prior to construction. The Architectural plans will hold precedence over mechanical plans as to location of partitions, etc. All construction dimensions shall be coordinated with the Architectural Drawings where discrepancies may exist.

1.11 MODIFICATIONS TO EXISTING EQUIPMENT

A. All existing equipment including piping and ductwork affected by this Project shall be treated as new.
B. The Contractor shall be responsible to provide new insulation and hangers for all existing equipment and piping to remain.
C. Existing insulation and hangers may remain if the insulation and hangers comply fully with all provisions of the Project Manual and Contract Drawings.

1.12 INSTALLATION OF EQUIPMENT

A. The Contractor shall be responsible to install all equipment as per the Manufacturer's written recommendations.
B. Due to the small scale of the drawings, not all devices and appurtenances can be shown on the Contract Documents. The Contractor shall include all devices, piping, wiring and other equipment required for a fully functional installation.
C. The Contractor shall be responsible to provide piping diagrams and all other required site specific information to the Equipment Manufacturer for review prior to installation of the equipment or any of the associated piping or devices.
D. All devices requiring service shall be installed in accessible locations. Access shall be provided at all control valves, isolation valves, control devices and panels, damper operators and motors. All such devices installed above suspended acoustical ceilings with removable pads shall be oriented such that the Manufacturer's recommended clearances are met. The Contractor shall provide access panels at all devices installed above all other ceilings, behind casework and in all other inaccessible locations. The minimum size of the access panels shall be 18"x18". Access panels shall be fire rated where installed in fire rated construction. Color of panels shall be as selected by the Architect.
E. The Contractor shall be responsible to provide all modifications to all equipment required to connect the equipment to the required electrical feeds. These modifications shall include, but shall not be limited to, replacement of wiring lugs required to fit power or control wiring and the installation of additional wiring or conduits.
F. Any modifications to the Work shown on the Contract Documents (including, but not limited to, additional devices, modifications to electrical feeds or modifications to piping sizes) required by the Equipment Manufacturer shall be provided by the Contractor. No additional compensation will be allowed for any modifications required by the Manufacturer for a fully functional installation.

1.13 FLOOR AND WALL PENETRATIONS

A. All floor and wall penetrations for all equipment including ductwork, piping, conduit, etc. shall be sealed. Sealant used shall be applied to both sides of penetration.
B. Rating of sealant used shall meet or exceed the UL fire rating of the floor or wall assembly.
C. Sealants shall remain flexible throughout the entire temperature and expansion range of the affected system.
D. All sealants used shall be fully plenum rated and shall have a flame spread rating of less than 25 and a smoke developed rating of not more than 50.
E. Insulation, where applied, shall be continuous through wall or floor penetration. Insulation thickness and vapor barrier integrity shall also remain continuous through penetration.

1.14 ACCEPTABLE BASE BID MANUFACTURERS

A. The Contract Documents have been prepared for the installation of the equipment scheduled on the Drawings. Acceptable Base Bid Manufacturers have been included in the Project Manual.
B. The Contractor shall be responsible to provide all modifications to the Work shown on the Drawings required for the installation of equipment provided by the Acceptable Base Bid Manufacturers. These modifications shall include, but shall not be limited to, electrical feeds, pipe sizes, support structure, etc.
C. All required modifications shall be coordinated by the Contractor prior to submitting the Bid. No additional compensation shall be allowed for any changes to the Work shown on the Drawings required for any equipment provided by an Acceptable Base Bid Manufacturer.

1.15 PROTECTION

A. The Contractor shall keep all pipe openings closed by means of plugs or caps to prevent entrance of foreign matter and shall cover all fixtures, equipment and apparatus as required to protect them against dirt, water, chemical or mechanical damage before, during and after installation. Any such fixtures, equipment or apparatus damaged prior to final acceptance of the Work shall be restored to its original condition or replaced by the Contractor.

1.16 JURISDICTION OF WORK

A. Whenever it becomes necessary for a Subcontractor to furnish Labor and Materials other than that which is generally accepted by trade agreement or general practices to belong to his particular trade or branch of work, he shall Subcontract such work or branch of work involved.
B. However, if there is an overlapping of trades, practices or trade agreements and a jurisdictional dispute arises to claims of tradesmen of another Subcontractor, and a trade union settlement is made in favor of these tradesmen who claimed the work, he shall perform it at his own expense as if it has been included in his Work. All such Work shall be executed in such a manner that there will be no delay or stoppage of work due to infringement or alleged infringement of trade agreements as to jurisdiction.

1.17 CLEANING

A. The Contractor shall clean premises of all excess construction material and debris caused by the Work at the completion of the Work or at the direction of the Owner, Architect or Owner's agent during the course of the Project. All equipment provided by the Contractor shall be thoroughly washed down prior award of Substantial Completion.

1.18 INSTRUCTIONS AND TRAINING

A. The Contractor shall instruct the Owner's personnel in the operation and maintenance of equipment installed as part of this Project. In addition, the Contractor shall furnish to the Owner three (3) sets of typewritten instructions. The Contractor shall also furnish to the Owner three (3) sets of equipment maintenance and operations manuals for each item of equipment.
B. In addition to written instructions the Contractor shall provide field instruction as follows.
    1. Two sessions for a total of 8 hours
C. Notify the Architect seven days in advance of all instruction sessions so the Architect can coordinate with the Owner and be present.
D. For each session, the Contractor shall submit a training session log prepared by the Contractor and signed by the Owner and the Contractor. The log shall certify that the above has been

satisfactorily completed and that the Owner's copies of manuals and written instruction were on hand at the time of the session.

E. All training sessions shall be video taped and two copies shall be provided to the Owner.

F. The training sessions shall be coordinated by the Contractor with all Subcontractors to avoid numerous trips by the Owner.

1.19 WARRANTY

A. All work shall be guaranteed for two years after Substantial Completion and final acceptance against all defects of material, equipment and workmanship. All defects appearing within two years shall be promptly remedied without further cost to the Owner.

B. All equipment shall be guaranteed to meet specified capacities and to operate within limits of noise level and vibration recommended in the current issue of the ASHRAE Guide and Data Book.

C. Any portion or the work performed by the Contractor that fails within the warranty period shall be repaired or replaced by the Contractor without additional cost to the Owner.

D. Additional specific warranties may be found in other sections of this Specification.

END OF SECTION

SECTION 220523 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Angle valves.
B. Ball valves.
C. Butterfly valves.
D. Check valves.
E. Gate valves.
F. Globe valves.

1.02 RELATED REQUIREMENTS

A. Section 220553 - Plumbing Identification.
B. Section 220719 - Plumbing Piping Insulation.
C. Section 221005 - Plumbing Piping.

1.03 ABBREVIATIONS AND ACRONYMS

A. CWP: Cold working pressure.
B. EPDM: Ethylene propylene copolymer rubber.
C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
D. NRS: Non-rising stem.
E. OS&Y: Outside screw and yoke.
F. PTFE: Polytetrafluoroethylene.
G. RS: Rising stem.
H. TFE: Tetrafluoroethylene.
I. WOG: Water, oil, and gas.

1.04 REFERENCE STANDARDS

A. API STD 594 - Check Valves: Flanged, Lug, Wafer, and Butt-Welding; 2022.
B. ASME B1.20.1 - Pipe Threads, General Purpose, Inch; 2013 (Reaffirmed 2018).
C. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2020.
D. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard; 2020.
E. ASME B16.10 - Face-to-Face and End-to-End Dimensions of Valves; 2022.
F. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.
G. ASME B16.34 - Valves — Flanged, Threaded, and Welding End; 2020.
H. ASME B31.9 - Building Services Piping; 2020.
I. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2022.
J. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings; 2004 (Reapproved 2019).
K. ASTM A536 - Standard Specification for Ductile Iron Castings; 1984, with Editorial Revision (2019).
L. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings; 2017.
M. AWWA C606 - Grooved and Shouldered Joints; 2022.

N. MSS SP-67 - Butterfly Valves; 2022.
O. MSS SP-70 - Gray Iron Gate Valves, Flanged and Threaded Ends; 2011.
P. MSS SP-71 - Gray Iron Swing Check Valves, Flanged and Threaded Ends; 2018.
Q. MSS SP-72 - Ball Valves with Flanged or Butt-Welding Ends for General Service; 2010a.
R. MSS SP-80 - Bronze Gate, Globe, Angle, and Check Valves; 2019.
S. MSS SP-85 - Gray Iron Globe and Angle Valves, Flanged and Threaded Ends; 2011.
T. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010, with Errata .
U. NSF 61 - Drinking Water System Components - Health Effects; 2023, with Errata.
V. NSF 372 - Drinking Water System Components - Lead Content; 2022.

1.05 SUBMITTALS

A. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
B. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
C. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.

1.06 QUALITY ASSURANCE

A. Manufacturer:
    1. Obtain valves for each valve type from single manufacturer.
    2. Company must specialize in manufacturing products specified in this section, with not less than three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:
    1. Minimize exposure of operable surfaces by setting plug and ball valves to open position.
    2. Protect valve parts exposed to piped medium against rust and corrosion.
    3. Protect valve piping connections such as grooves, weld ends, threads, and flange faces.
    4. Adjust globe, gate, and angle valves to the closed position to avoid clattering.
    5. Secure check valves in either the closed position or open position.
    6. Adjust butterfly valves to closed or partially closed position.
B. Use the following precautions during storage:
    1. Maintain valve end protection and protect flanges and specialties from dirt.
        a. Provide temporary inlet and outlet caps.
        b. Maintain caps in place until installation.
    2. Store valves in shipping containers and maintain in place until installation.
        a. Store valves indoors in dry environment.
        b. Store valves off the ground in watertight enclosures when indoor storage is not an option.

1.08 EXERCISE THE FOLLOWING PRECAUTIONS FOR HANDLING:

A. Handle large valves with sling, modified to avoid damage to exposed parts.
B. Avoid the use of operating handles or stems as rigging or lifting points.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. Listed pipe sizes shown using nominal pipe sizes (NPS) and nominal diameter (DN).
B. Provide the following valves for the applications if not indicated on drawings:
    1. Shutoff: Ball or butterfly
    2. Throttling: Provide globe, ball, or butterfly.
    3. Swing Check (Pump Outlet):
        a. 2 NPS and Smaller: Bronze swing check valves with bronze disc.
        b. 2-1/2 NPS and Larger for Domestic Water: Iron swing check valves with closure control , metal seat check valves.
        c. 2-1/2 inch and Larger for Sanitary Waste and Storm Drainage: Iron swing check valves with lever and weight or spring.
C. Domestic, Hot and Cold Water Valves:
    1. 2 inch and Smaller:
        a. Ball: Two piece, full port, bronze with stainless-steel trim.
        b. Bronze Swing Check: Class 125, bronze disc.
    2. 2-1/2 inch and Larger:
        a. Iron Ball: Class 150.
        b. Iron Grooved-End Butterfly: 175 CWP.
        c. Iron Swing Check: Class 125, metal seats.
        d. Iron Grooved-End Swing Check: 300 CWP.
        e. Iron Gate: Class 125, NRS.
        f. Iron Globe: Class 125.
D. Sanitary Waste and Storm Drainage Water Valves:
    1. 2 inch and Smaller:
        a. Ball: Two piece, full port, brass with stainless-steel trim.
        b. Bronze Swing Check: Class 125, bronze disc.
        c. Bronze Gate: Class 125, NRS.
    2. 2-1/2 inch and Larger:
        a. Iron Swing Check: Class 125, metal seats.
        b. Iron Gate: Class 125, NRS.

2.02 GENERAL REQUIREMENTS

A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.
B. Valve Sizes: Match upstream piping unless otherwise indicated.
C. Valve Actuator Types:
    1. Handwheel: Valves other than quarter-turn types.
    2. Hand Lever: Quarter-turn valves 6 inch and smaller except plug valves.
D. Insulated Piping Valves: With 2 inch stem extensions and the following features:
    1. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.

2. Butterfly Valves: Extended neck.

E. Valve-End Connections:
1. Threaded End Valves: ASME B1.20.1.
2. Flanges on Iron Valves: ASME B16.1 for flanges on iron valves.
3. Pipe Flanges and Flanged Fittings 1/2 inch through 24 inch: ASME B16.5.
4. Solder Joint Connections: ASME B16.18.
5. Grooved End Connections: AWWA C606.

F. General ASME Compliance:
1. Ferrous Valve Dimensions and Design Criteria: ASME B16.10 and ASME B16.34.
2. Solder-joint Connections: ASME B16.18.
3. Building Services Piping Valves: ASME B31.9.

G. Potable Water Use:
1. Certified: Approved for use in compliance with NSF 61 and NSF 372.
2. Lead-Free Certified: Wetted surface material includes less than 0.25 percent lead content.

H. Source Limitations: Obtain each valve type from a single manufacturer.

2.03 **MANUFACTURERS**

A. Appollo Valves: www.appolovalves.com
B. Nibco, Inc.: www.nibco.com
C. Milwaukee Valve Company: www.milwaukeevalve.com
D. Jomar Valve: www.jomarvalve.com
E. Hammond Valve: www.hammondvalve.com

2.04 BRONZE, BALL VALVES

A. General:
1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

B. Two Piece, Full Port with Stainless Steel Trim:
1. Comply with MSS SP-110.
2. Body: Forged bronze or dezincified-brass alloy.
3. Seats: PTFE.
4. Stem: Stainless steel.
5. Ball: Chrome plated brass.

2.05 IRON, BALL VALVES

A. Class 125, Full Port, Stainless Steel Trim:
1. Comply with MSS SP-72.
2. CWP Rating: 200 psi.
3. Body: ASTM A536 Grade 65-45-12, ductile iron.
4. Ends: Flanged.
5. Seats: PTFE.
6. Stem: Stainless steel.
7. Ball: Stainless steel.
8. Operator: Lever with locking handle.

2.06 IRON, GROOVED-END BUTTERFLY VALVES

A. CWP Rating: 175 psi.
   1. Comply with MSS SP-67, Type I.
   2. Body: Coated ductile iron.
   3. Stem: Two-piece stainless steel.
   4. Disc: Coated ductile iron.
   5. Disc Seal: EPDM.

2.07 BRONZE, SWING CHECK VALVES

A. General:
   1. Fabricate from dezincification resistant material.
   2. Copper alloys containing more than 15 percent zinc are not permitted.
B. Class 125: CWP Rating: 200 psig (1380 kPa).
   1. Pressure and Temperature Rating: MSS SP-80, Type 3.
   2. Design: Y-pattern, horizontal or vertical flow.
   3. Body: Bronze, ASTM B62.
   4. End Connections: Threaded.
   5. Disc: Bronze.

2.08 IRON, HORIZONTAL SWING CHECK VALVES

A. Class 125:
   1. Pressure and Temperature Rating: MSS SP-71, Type I.
   2. Design: T-body style for clear or full waterways.
   3. WOG Rating: 200 psi.
   4. Body: ASTM A126, gray cast iron with bolted bonnet.
   5. End Connections: Flanged.
   6. Trim: Composition.
   7. Seat Ring and Disc Holder: Bronze.
   8. Disc: PTFE.
   9. Gasket: Asbestos free.

2.09 IRON, GROOVED-END SWING CHECK VALVES

A. Class 300:
   1. CWP Rating: 300 psi.
   2. Body: ASTM A536, Grade 65-45-12 ductile iron.
   3. Seal: EPDM.
   4. Disc: Ductile iron.
   5. Coating: Black, non-lead paint.

2.10 BRONZE, GATE VALVES

A. General:
   1. Fabricate from dezincification resistant material.
   2. Copper alloys containing more than 15 percent zinc are not permitted.
B. Rising Stem or OS&Y:

1. Pressure-Temperature Range: MSS SP-80, Type I.
2. Body: ASTM B62, bronze with integral seat and screw-in bonnet.
3. End Connections: Threaded or solder.
4. Stem: Bronze.
5. Disc: Solid wedge; bronze.
6. Packing: Asbestos free.
7. Handwheel Operator: Malleable iron.

2.11 IRON, GATE VALVES

A. OS & Y:
1. Pressure and Temperature Rating: MSS SP-70, Type I.
2. Body: ASTM A126, gray iron with bolted bonnet.
3. End Connections: Flanged.
4. Trim: Bronze.
5. Disc: Solid wedge.
6. Packing and Gasket: Asbestos free.

PART 3 EXECUTION

3.01 EXAMINATION

A. Discard all packing materials and verify that valve interior, including threads and flanges are completely clean without signs of damage or degradation that could result in leakage.
B. Verify valve parts to be fully operational in all positions from closed to fully open.
C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.
D. Should valve is determined to be defective, replace with new valve.

3.02 INSTALLATION

A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.
B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.
C. Where valve support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.
D. Install check valves where necessary to maintain direction of flow as follows:
1. Lift Check: Install with stem plumb and vertical.
2. Swing Check: Install horizontal maintaining hinge pin level.

END OF SECTION

SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Strut systems for pipe or equipment support.
B. Beam clamps.
C. Pipe hangers.
D. Pipe supports, guides, shields, and saddles.
E. Anchors and fasteners.

1.02 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
C. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General-Purpose Piping; 2022.
D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999, with Editorial Revision (2022).
F. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2013.
G. ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures; 1999 (Reapproved 2022).
H. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
I. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2018a.
J. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.
K. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
L. FM (AG) - FM Approval Guide; Current Edition.
M. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).
N. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
O. UL (DIR) - Online Certifications Directory; Current Edition.
P. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
2. Coordinate the work with other trades to provide additional framing and materials required for installation.
3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
5. Notify Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 033000.

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.
B. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.
1. Application of protective inserts, saddles, and shields at pipe hangers for each type of insulation and hanger.
C. Evaluation Reports: For products specified as requiring evaluation and recognition by ICC Evaluation Service, LLC (ICC-ES), provide current ICC-ES evaluation reports upon request.
D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.05 QUALITY ASSURANCE

A. Comply with applicable building code.
B. Installer Qualifications for Field-Welding: As specified in Section 055000.
C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Provide required hardware to hang or support piping, equipment, or fixtures with related accessories as necessary to complete installation of plumbing work.
B. Provide hardware products listed, classified, and labeled as suitable for intended purpose.
C. Materials for Metal Fabricated Supports: Comply with Section 055000.
1. Zinc-Plated Steel: Electroplated in accordance with ASTM B633 unless stated otherwise.

2. Galvanized Steel: Hot-dip galvanized in accordance with ASTM A123/A123M or ASTM A153/A153M unless stated otherwise.

D. Corrosion Resistance: Use corrosion-resistant metal-based materials fully compatible with exposed piping materials and suitable for the environment where installed.

2.02 STRUT SYSTEMS FOR PIPE OR EQUIPMENT SUPPORT

A. Strut Channels:
   1. Manufacturers:
      a. ABB Installation Products: electrification.us.abb.com/#sle.
      b. Gripple, Inc; Universal Bracket: www.gripple.com/#sle.
      c. Unistrut, a brand of Atkore International Inc: www.unistrut.com/#sle.
   2. ASTM A653/A653M galvanized steel bracket with clamps for surface mounting of piping or plumbing equipment support.
   3. Channel or Bracket Kits: Include rods, brackets, end-fixed fittings, covers, clips, and other related hardware required to complete sectional trapeze section for piping or other support.

B. Hanger Rods:
   1. Threaded zinc-plated steel unless otherwise indicated.

C. Channel Nuts:
   1. Provide carbon steel channel nut with epoxy copper or zinc finish and long, regular, or short spring as indicated on drawings.

2.03 BEAM CLAMPS

A. MSS SP-58 types 19 through 23, 25 or 27 through 30 based on required load.

B. C-Clamp: MSS SP-58 type 23, malleable iron and steel with plain, stainless steel, and zinc finish.

C. Small or Junior Beam Clamp: MSS SP-58 type 19, malleable iron with plain finish. For inverted usage provide manufacturer listed size(s).

D. Wide Mouth Beam Clamp: MSS SP-58 type 19, malleable iron with plain finish.

E. Centerload Beam Clamp with Extension Piece: MSS SP-58 type 30, malleable iron with plain finish.

F. FM (AG) and UL (DIR) Approved Beam Clamp: MSS SP-58 type 19, plain finish.

G. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.

H. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.

2.04 PIPE HANGERS

A. Band Hangers, Adjustable:
   1. MSS SP-58 type 7 or 9, zinc-plated ASTM A1011/A1011M steel or ASTM A653/A653M carbon steel.

B. J-Hangers, Adjustable:
   1. MSS SP-58 type 5, zinc-plated ASTM A1011/A1011M steel or ASTM A653/A653M carbon steel.

C. Swivel Ring Hangers, Adjustable:
   1. MSS SP-58 type 10, epoxy-painted, zinc-colored.

2. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.
3. FM (AG) and UL (DIR) listed for specific pipe size runs and loads.

D. Clevis Hangers, Adjustable:
1. Copper Tube: MSS SP-58 type 1, epoxy-plated copper.
2. Light-Duty: MSS SP-58 type 1, zinc-colored, epoxy plated.
3. Standard-Duty: MSS SP-58 type 1, zinc-colored, epoxy plated.

2.05 PIPE CLAMPS

A. Riser Clamps:
1. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.
2. MSS SP-58 type 1 or 8, carbon steel or steel with epoxy plated, plain, stainless steel, or zinc plated finish.
3. UL (DIR) listed: Pipe sizes 1/2 to 8 inch.

B. Strut Clamps:
1. Pipe Clamp: Two-piece rigid, universal, or outer diameter type, carbon steel with epoxy copper or zinc finish.
2. Cushioned Pipe or Tubing Strut Clamp: Provide strut clamp with thermoplastic elastomer cushion having dielectric strength of 670 V/mil.

2.06 PIPE SUPPORTS, GUIDES, SHIELDS, AND SADDLES

A. Dielectric Barriers: Provide between metallic supports and metallic piping and associated items of dissimilar type; acceptable dielectric barriers include rubber or plastic sheets or coatings attached securely to pipe or item.

B. Stanchions:
1. Material: Malleable iron, ASTM A47/A47M; or carbon steel, ASTM A36/A36M.
2. Provide coated or plated saddles to isolate steel hangers from dissimilar metal tube or pipe.

C. U-Bolts:
1. MSS SP-58 type 24, carbon steel u-bolt for pipe support or anchoring.

D. Intermediate Anchors and Pipe Alignment Guides:
1. Pipe Sizes 6 inch and Smaller: Minimum clearance of 0.16 inch.
2. Pipe Size 8 inch: 0.625 inch U-bolt with double nuts providing minimum clearance of 0.28 inch.
3. Pipe Size 10 inch: 0.75 inch U-bolt.
4. Pipe Sizes 12 to 16 inch: 0.875 inch U-bolt.
5. Pipe Sizes 18 to 30 inches: 1 inch U-bolt.
6. Use pipe clamps with oversize pipe sleeve that provides clearance around pipe.

E. Pipe Alignment Guides, Galvanized steel:
1. Pipe Sizes 8 inch and Smaller: Spider or sleeve type.
2. Pipe Sizes 10 inch and Larger: Roller type.

F. Pipe Shields for Insulated Piping:
1. MSS SP-58 type 40, ASTM A1011/A1011M steel or ASTM A653/A653M carbon steel.
2. General Construction and Requirements:

a. Surface Burning Characteristics: Comply with ASTM E84 or UL 723.
b. Shields Material: UV-resistant polypropylene with glass fill.
c. Maximum Insulated Pipe Outer Diameter: 12-5/8 inch.
d. Service Temperature: Minus 40 to 178 degrees F.
e. Pipe shields to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.

G. Pipe Supports:
1. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.
2. Liquid Temperatures Up to 122 degrees F:
a. Overhead Support: MSS SP-58 types 1, 3 through 12 clamps.
b. Support From Below: MSS SP-58 types 35 through 38.
3. Operating Temperatures from 122 to 446 degrees F:
a. Overhead Support: MSS SP-58 type 1 or 3 through 12 clamps with appropriate saddle of MSS SP-58 type 40 for insulated pipe.
b. Roller Chair: MSS SP-58 types 41 or 43 through 46 roller chair support with appropriate saddle of MSS SP-58 type 39 for insulated pipe.
c. Sliding Support: MSS SP-58 types 35 through 38.

H. Pipe Supports, Thermal Insulated:
1. General Requirements:
a. Insulated pipe supports to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
b. Surface Burning Characteristics: Flame spread index/smoke developed index of 5/30, maximum, when tested in accordance with ASTM E84 or UL 723.
c. Provide pipe supports for 1/2 to 30 inch iron pipes.
d. Insulation inserts to consist of rigid phenolic foam insulation surrounded by 360 degree, PVC jacketing.
2. PVC Jacket:
a. Pipe insulation protection shields to be provided with ball bearing hinge and locking seam.
b. Moisture Vapor Transmission: 0.0071 perm inch, when tested in accordance with ASTM E96/E96M.
c. Minimum Thickness: 60 mil, 0.06 inch.

2.07 ANCHORS AND FASTENERS

A. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
B. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
C. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
D. Hollow Masonry: Use toggle bolts.
E. Steel: Use beam ceiling clamps, beam clamps, machine bolts, or welded threaded studs.
F. Beam Ceiling Flanges: ASTM A47/A47M Grade 32510, malleable iron or stainless steel with copper, plain, stainless steel, or zinc finish.
G. Sheet Metal: Use sheet metal screws.

H. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.

I. Preset Concrete Inserts: Continuous metal strut channel and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.

1. Channel Material: Use galvanized steel.
2. Manufacturer: Same as manufacturer of metal strut channel framing system.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive support and attachment components.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

C. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.

D. Unless specifically indicated or approved by Engineer, do not provide support from suspended ceiling support system or ceiling grid.

E. Unless specifically indicated or approved by Engineer, do not provide support from roof deck.

F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

G. Field-Welding (where approved by Engineer): Comply with Section 055000.

H. Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.

I. Equipment Support and Attachment:

1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
4. Unless otherwise indicated, mount floor-mounted equipment on properly sized 3 inch high concrete pad constructed in accordance with Section 033000.
5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

J. Preset Concrete Inserts: Use manufacturer-provided closure strips to inhibit concrete seepage during concrete pour.

K. Secure fasteners according to manufacturer's recommended torque settings.

L. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

A. Inspect support and attachment components for damage and defects.

B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

C. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

SECTION 220533 - HEAT TRACING FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Self-regulating parallel resistance electric heating cable.
B. Cable outer jacket markings.
C. Connection kits.
D. Controls.

1.02 RELATED REQUIREMENTS

A. Section 220553 - Plumbing Identification
B. Section 220719 - Plumbing Piping Insulation.
C. Section 221005 - Plumbing Piping.
D. Section 221006 - Plumbing Piping Specialties.

1.03 REFERENCE STANDARDS

A. IEEE 515.1 - IEEE Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Commercial Applications; 2012.
B. ITS (DIR) - Directory of Listed Products; Current Edition.
C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
D. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with other trades to provide ground fault protection for electric heat tracing circuits as required by NFPA 70.
B. Coordinate the work with other trades to provide circuit breaker ratings suitable for installed circuit lengths.

1.05 SUBMITTALS

A. Product Data: Provide data for electric heat tracing.
B. Shop Drawings: Indicate electric heat tracing layout, electrical terminations, thermostats, controls, and branch circuit connections.
C. Manufacturer's Installation Instructions: Indicate installation instructions and recommendations.
D. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

PART 2 PRODUCTS

2.01 SELF-REGULATING PARALLEL RESISTANCE ELECTRIC HEATING CABLE

A. Manufacturers:
   1. Chromalox, Inc: www.chromalox.com/#sle.
   2. Thermon Manufacturing Company: www.thermon.com/#sle.

B. Provide products listed, classified, and labeled by UL (DIR), ITS (DIR), or testing firm acceptable to authorities having jurisdiction (AHJ).
C. Factory Rating and Testing: Comply with IEEE 515.1.
D. Heating Element:
    1. Provide pair of parallel No.16 tinned or nickel coated stranded copper bus wires embedded in cross linked conductive polymer core with varying heat output in response to temperature along its length.
    2. Terminations: Waterproof, factory assembled, non-heating leads with connector at one end and water-tight seal at opposite end.
    3. Capable of crossing over itself without overheating.
E. Insulated Jacket: Flame retardant polyolefin.
F. Cable Cover: Provide tinned copper and polyolefin outer jacket with UV inhibitor.
G. Maximum Power-On Operating Temperature: 150 degrees F.
H. Maximum Power-Off Exposure Temperature: 185 degrees F.

2.02 CABLE OUTER JACKET MARKINGS

A. Name of manufacturer, trademark, or other recognized symbol of identification.
B. Catalog number, reference number, or model.
C. Month and year of manufacture, date coding, applicable serial number, or equivalent.
D. Agency listing or approval.

2.03 CONNECTION KITS

A. Provide power connection, splice/tee, and end seal kits compatible with the heating cable and without requiring cutting of the cable core to expose bus wires.
B. Provide with NEMA 4X rating for prevention of corrosion and water ingress.

2.04 CONTROLS

A. Pipe Mounted Thermostats:
    1. Remote bulb unit with adjustable temperature range from 30 to 50 degrees F.
    2. Control Enclosure: Corrosion resistant and waterproof.
B. Line sensing high-limit temperature control and high-limit alarm.
C. Programmable Controller:
    1. Micro-processor based.
    2. Capable of four separate schedules.
    3. On/Off/Auto switch.
    4. 365 day calendar with 20 programmable holidays.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that piping and equipment are ready to receive work.
B. Verify field measurements are as indicated on shop drawings.
C. Verify required power is available, in proper location, and ready for use.

3.02 PREPARATION

A. Clean exposed surfaces prior to installation.
B. Prepare surfaces using approved methods as recommended by manufacturer.

3.03 INSTALLATION

A. Install in accordance with manufacturer's written installation instructions.
B. Comply with installation requirements of IEEE 515.1 and NFPA 70, Article 427.
C. Apply heating cable linearly on pipe with fiberglass tape only after piping has successfully completed any required pressure testing.
D. Comply with applicable local building codes and requirements of authorities having jurisdiction.
E. Identification:
    1. After thermal insulation installation, apply external pipeline decals to indicate presence of the thermal insulation cladding at intervals not to exceed 20 ft including cladding over each valve or other equipment that may require maintenance.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.
B. Perform start-up by factory technician or factory representative as per Owner's requirements.
C. Field Testing and Inspections:
    1. Commission system in accordance with installation and operation manual.
    2. Inspect for sources of water entry and proper sealing.
    3. Inspect weather barrier to confirm that no sharp edges are contacting the trace heating.
    4. Insulation Resistance: Greater than 20 megohms at a test voltage of 2500 VDC for polymer insulated trace heaters.
    5. Test heating cable integrity with megohmmeter at the following intervals:
        a. Before installing the cable.
        b. After cable has been installed onto the piping.
    6. Measure voltage and current at each unit.
    7. Controls:

END OF SECTION

SECTION 220553 - PLUMBING IDENTIFICATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tags.
B. Pipe markers.

1.02 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2020.

1.03 SUBMITTALS

A. Schedules:
   1. Submit plumbing component identification schedule listing equipment, piping, and valves.
   2. Detail proposed component identification data in terms of of wording, symbols, letter size, and color coding to be applied to corresponding product.
   3. Valve Data Format: Include id-number, location, function, and model number.
B. Product Data: Provide manufacturers catalog literature for each product required.
C. Manufacturer's Installation Instructions: Indicate special procedures, and installation.
D. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.01 PLUMBING COMPONENT IDENTIFICATION GUIDELINE

A. Tags:
   1. Manual operated and automated control valves.
B. Pipe Markers: 3/4 inch diameter and higher.

2.02 TAGS

A. Manufacturers:
   1. Advanced Graphic Engraving: www.advancedgraphicengraving.com.
   2. Brady Corporation: www.bradycorp.com.
   3. Brimar Industries, Inc: www.pipemarker.com/#sle.
   4. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com.
   5. Seton Identification Products: www.seton.com.
B. Flexible: Vinyl with engraved black letters on light contrasting background color with up to three lines of text. Minimum tag size 1-1/2 inch in diameter.
C. Metal: Brass, 19 gauge 1-1/2 inch in diameter with smooth edges, blank, smooth edges, and corrosion-resistant ball chain. Up to three lines of text.
D. Valve Tag Chart: Typewritten 12-point letter size list in anodized aluminum frame.

2.03 PIPE MARKERS

A. Manufacturers:
   1. Brady Corporation: www.bradycorp.com.
   2. Brimar Industries, Inc.: www.pipemarker.com.

3. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com.
4. Seton Identification Products: www.seton.com.

B. Comply with ASME A13.1.

C. Flexible Tape Marker: Flexible, vinyl film tape with pressure-sensitive adhesive backing and printed markings.

D. Identification Scheme, ASME A13.1:
1. Primary: External Pipe Diameter, Uninsulated or Insulated.
2. Secondary: Color scheme per fluid service.
a. Water; Potable, Cooling, Boiler Feed, and Other: White text on green background.
3. Tertiary: Other Details.
a. Directional flow arrow.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive identification products.

3.02 INSTALLATION

A. Install tags in clear view and align with axis of piping

B. Install plastic pipe markers in accordance with manufacturer's instructions.

C. Install plastic tape pipe markers complete around pipe in accordance with the Manufacturer's instructions.

D. Apply ASME A13.1 Pipe Marking Rules:
1. Place pipe marker adjacent to changes in direction.
2. Place pipe marker adjacent each valve port and flange end.
3. Place pipe marker at both sides of floor and wall penetrations.
4. Place pipe marker every 25 to 50 feet interval of straight run.

E. Identify piping, concealed or exposed, with plastic tape pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION

SECTION 220719 - PLUMBING PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Glass fiber insulation.
B. Jacketing and accessories.
C. Domestic supply piping insulation.

1.02 RELATED REQUIREMENTS

A. Section 221005 - Plumbing Piping: Placement of hangers and hanger inserts.

1.03 REFERENCE STANDARDS

A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019, with Editorial Revision (2023).
B. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.
C. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation; 2022.
D. ASTM C585 - Standard Practice for Inner and Outer Diameters of Thermal Insulation for Nominal Sizes of Pipe and Tubing; 2022.
E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
F. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022a, with Editorial Revision (2023).
G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
B. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.
B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum 5 years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with the Manufacturer's identification, product density, and thickness.

1.07 FIELD CONDITIONS

A. Maintain ambient conditions required by the Manufacturers of each product.

B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, UL 723, ASTM E84, or UL 723.

2.02 GLASS FIBER INSULATION

A. Manufacturers:
   1. CertainTeed Corporation: www.certainteed.com.
   2. Johns Manville Corporation: www.jm.com.
   3. Knauf Insulation: www.knaufinsulation.com/#sle.
   4. Manson: www.imanson.com
   5. Owens Corning Corporation: www.ocbuildingspec.com.

B. Insulation: ASTM C547and ASTM C795; rigid molded, noncombustible.
   1. K Value: ASTM C177, 0.24 at 75 degrees F.
   2. Maximum Service Temperature: 850 degrees F.
   3. Maximum Moisture Absorption: 0.2 percent by volume.

C. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm.

D. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

E. Vapor Barrier Lap Adhesive: Compatible with insulation.

F. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.

2.03 JACKETING AND ACCESSORIES

A. PVC Plastic Jacket:
   1. Manufacturers:
      a. Johns Manville/Zeston.
   2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
      a. Minimum Service Temperature: 0 degrees F.
      b. Maximum Service Temperature: 150 degrees F.
      c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
      d. Thickness: 10 mil, 0.010 inch.
      e. Connections: Brush on welding adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that piping has been tested before applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

A. Install in accordance with the manufacturer's instructions.

B. Install in accordance with North American Insulation Manufacturers Association (NAIMA) National Insulation Standards.

C. Exposed Piping: Locate insulation and cover seams in least visible locations.

D. All Insulated piping: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

E. All glass fiber insulated piping:
   1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
   2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

F. Inserts and Shields:
   1. Application: All piping
   2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
   3. Insert Location: Between support shield and piping and under the finish jacket.
   4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
   5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

G. Continue insulation through walls, sleeves, pipe hangers, supports and other pipe penetrations. Finish at protrusions, and interruptions. At fire separations, provide fire safing with rating equal to or greater than the required rating.

3.03 SCHEDULES

A. Plumbing Systems:
   1. Domestic cold water supply:
      a. Glass Fiber Insulation:
         1) Pipe Size Range: All
         2) Thickness: 1 inch.
   2. Domestic Hot Water and Hot Water Recirculation:
      a. Glass Fiber Insulation:
         1) Pipe Size Range: All sizes.
         2) Thickness 1 1/2"

END OF SECTION

SECTION 221005 - PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sanitary waste and vent piping, buried within 5 feet of building.
B. Sanitary waste and vent piping, above grade.
C. Domestic water piping, above grade.

1.02 RELATED REQUIREMENTS

A. Section 220529 - Hangers and Supports for Plumbing Piping and Equipment.
B. Section 220548 - Vibration and Seismic Controls for Plumbing Piping and Equipment.
C. Section 220553 - Plumbing Identification.
D. Section 220719 - Plumbing Piping Insulation.
E. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2020.
B. ASME B16.4 - Gray Iron Threaded Fittings: Classes 125 and 250; 2021.
C. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.
D. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.
E. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings: DWV; 2021.
F. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder-Joint Drainage Fittings—DWV; 2017.
G. ASME B31.9 - Building Services Piping; 2020.
H. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.
I. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2021.
J. ASTM B32 - Standard Specification for Solder Metal; 2020.
K. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes; 2020.
L. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2022.
M. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2020.
N. ASTM B306 - Standard Specification for Copper Drainage Tube (DWV); 2020.
O. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2016.
P. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2016.
Q. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2020a.
R. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
S. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings; 2021.
T. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; 2017.
U. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast; 2017, with Errata (2018).

V. AWWA C651 - Disinfecting Water Mains; 2014, with Addendum (2020).
W. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2021.
X. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2020.
Y. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).
Z. MSS SP-67 - Butterfly Valves; 2022.
AA. MSS SP-70 - Gray Iron Gate Valves, Flanged and Threaded Ends; 2011.
BB. MSS SP-71 - Gray Iron Swing Check Valves, Flanged and Threaded Ends; 2018.
CC. MSS SP-80 - Bronze Gate, Globe, Angle, and Check Valves; 2019.
DD. MSS SP-85 - Gray Iron Globe and Angle Valves, Flanged and Threaded Ends; 2011.
EE. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010, with Errata .
FF. NSF 61 - Drinking Water System Components - Health Effects; 2023, with Errata.
GG. NSF 372 - Drinking Water System Components - Lead Content; 2022.
HH. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
B. Project Record Documents: Record actual locations of valves.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with applicable codes.
B. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Provide temporary protective coating on cast iron and steel valves.
B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.07 FIELD CONDITIONS

A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.
B. Plenum-Installed Acid Waste Piping: Flame-spread index equal or below 25 and smoke-spread index equal or below 50 according to ASTM E84 or UL 723 tests.

2.02 SANITARY SEWER AND VENT PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Cast Iron Pipe: ASTM A74 service weight.
   1. Fittings: Cast iron.
   2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.
   3. All pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and listed by NSF International.

B. Cast Iron Pipe: CISPI 301, hubless.
   1. Fittings: Cast iron.
   2. Joints: CISPI 310, neoprene gasket and stainless steel clamp and shield assemblies.
   3. All pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and listed by NSF International.

2.03 SANITARY SEWER AND VENT PIPING, ABOVE GRADE

A. Cast Iron Pipe: ASTM A74, service weight.
   1. Fittings: Cast iron.
   2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.
   3. All pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and listed by NSF International.

B. Cast Iron Pipe: CISPI 301, hubless, service weight.
   1. Fittings: Cast iron.
   2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.
   3. All pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and listed by NSF International.

C. Copper Tube: ASTM B306, DWV.
   1. Fittings: ASME B16.29, wrought copper, or ASME B16.23, sovent.
   2. Joints: ASTM B 32, alloy Sn95 solder.

D. Steel Pipe: ASTM A53/A53M Schedule 40, galvanized.
   1. Threaded Joints: ASME B16.4 cast iron fittings.

2.04 DOMESTIC WATER PIPING, ABOVE GRADE

A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
   2. Joints: ASTM B32, alloy Sn95 solder.

2.05 PIPE FLANGES, UNIONS, AND COUPLINGS

A. Unions for Pipe Sizes 3 inch and Under:
   1. Ferrous Pipe: Class 150 malleable iron threaded unions.
   2. Copper Tube and Pipe: Class 150 bronze unions with soldered joints.

B. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier or pipe nipple listed for service as a dielectric fitting.

2.06 PIPE HANGERS AND SUPPORTS

A. See Section 220529 for additional requirements.

B. Provide hangers and supports that comply with MSS SP-58.
   1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
   2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
   3. Trapeze Hangers: Welded steel channel frames attached to structure.
   4. Vertical Pipe Support: Steel riser clamp.
C. Plumbing Piping - Storm, Sanitary, and Vent:
   1. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
   2. Hangers for Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.
   3. Wall Support for Pipe Sizes to 3 inch: Cast iron hook.
   4. Wall Support for Pipe Sizes 4 inch and Over: Welded steel bracket and wrought steel clamp.
   5. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
D. Plumbing Piping - Water:
   1. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
   2. Hangers for Cold Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.
   3. Hangers for Hot Pipe Sizes 2 to 4 inch: Carbon steel, adjustable, clevis.
   4. Wall Support for Pipe Sizes Up to 3 inch: Cast iron hook.
   5. Wall Support for Pipe Sizes 4 inch and Larger: Welded steel bracket and wrought steel clamp.
   6. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
   7. Floor Support for Hot Pipe Sizes to 4 inch: Cast iron adjustable pipe saddle, locknut, nipple, floor flange, and concrete pier or steel support.
   8. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.07 STRAINERS

A. Manufacturers:
   1. Armstrong International, Inc: www.armstronginternational.com.
   2. Green Country Filter Manufacturing: www.greencountryfilter.com.
   3. WEAMCO: www.weamco.com.
B. Size 2 inch and Smaller:
   1. Threaded brass body for 175 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
   2. Class 150, threaded bronze body 300 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
C. Size 1-1/2 inch to 4 inch:
   1. Class 125, flanged iron body, Y pattern with 1/16 inch stainless steel perforated screen.
D. Size 5 inch and Larger:
   1. Class 125, flanged iron body, basket pattern with 1/8 inch stainless steel perforated screen.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
B. Remove scale and dirt, on inside and outside, before assembly.
C. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
E. Group piping whenever practical at common elevations.
F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. See Section 220516.
G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
H. Provide access where valves and fittings are not exposed.
I. Establish elevations of buried piping outside the building to ensure not less than 4 ft of cover.
J. Install vent piping penetrating roofed areas to maintain integrity of roof assembly.
K. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welding.
L. Provide support for utility meters in accordance with requirements of utility companies.
M. Prepare exposed, unfinished pipe, fittings, supports, and accessories for finish painting.
N. Install bell and spigot pipe with bell end upstream.
O. Install valves with stems upright or horizontal, not inverted. See Section 220523.
P. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
Q. Sleeve pipes passing through partitions, walls, and floors.
R. Inserts:
    1. Provide inserts for placement in concrete formwork.
    2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
    3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
    4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
    5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
S. Pipe Hangers and Supports:
    1. Install in accordance with ASME B31.9.

2. Support horizontal piping as indicated.
3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
4. Place hangers within 12 inches of each horizontal elbow.
5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
6. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
8. Provide copper plated hangers and supports for copper piping.
9. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
10. Provide hangers adjacent to motor-driven equipment with vibration isolation; see Section 220548.
11. Support cast iron drainage piping at every joint.

3.04 APPLICATION

A. Install unions downstream of valves and at equipment or apparatus connections.
B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
C. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
D. Install globe valves for throttling, bypass, or manual flow control services.
E. Provide lug end butterfly valves adjacent to equipment when provided to isolate equipment.
F. Provide spring-loaded check valves on discharge of water pumps.
G. Provide flow controls in water recirculating systems where indicated.

3.05 TOLERANCES

A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/8 inch per foot slope.
B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

3.06 FIELD TESTS AND INSPECTIONS

A. Verify and inspect systems according to requirements by the Authority Having Jurisdiction. In the absence of specific test and inspection procedures proceed as indicated below.
B. Domestic Water Systems:
   1. Perform hydrostatic testing for leakage prior to system disinfection.
   2. Test Preparation: Close each fixture valve or disconnect and cap each connected fixture.
C. Test Results: Document and certify successful results, otherwise repair, document, and retest.

3.07 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Disinfect water distribution system in accordance with Section 330110.58.
B. Prior to starting work, verify system is complete, flushed, and clean.
C. Ensure acidity (pH) of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
D. Inject disinfectant, free chlorine in liquid, powder, tablet, or gas form throughout system to obtain 50 to 80 mg/L residual.

E. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
F. Maintain disinfectant in system for 24 hours.
G. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
H. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
I. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.08 SCHEDULES

A. Pipe Hanger Spacing:
    1. Metal Piping:
        a. Pipe Size: 1/2 inch to 1-1/4 inch:
            1) Maximum Hanger Spacing: 6.5 ft.
            2) Hanger Rod Diameter: 3/8 inches.
        b. Pipe Size: 1-1/2 inch to 2 inch:
            1) Maximum Hanger Spacing: 10 ft.
            2) Hanger Rod Diameter: 3/8 inch.
        c. Pipe Size: 2-1/2 inch to 3 inch:
            1) Maximum Hanger Spacing: 10 ft.
            2) Hanger Rod Diameter: 1/2 inch.
        d. Pipe Size: 4 inch to 6 inch:
            1) Maximum Hanger Spacing: 10 ft.
            2) Provide supports at each joint.
            3) Hanger Rod Diameter: 5/8 inch.
        e. Pipe Size: 8 inch to 12 inch:
            1) Maximum Hanger Spacing: 10 ft.
            2) Provide supports at each joint.
            3) Hanger Rod Diameter: 7/8 inch.
        f. Pipe Size: 14 inch and Over:
            1) Maximum Hanger Spacing: 10 ft.
            2) Provide supports at each joint.
            3) Hanger Rod Diameter: 1 inch.

END OF SECTION

SECTION 221006 - PLUMBING PIPING SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Drains.
B. Floor drains.
C. Cleanouts.
D. Refrigerator wall boxes.
E. Thermostatic mixing valves.

1.02 RELATED REQUIREMENTS

A. Section 221005 - Plumbing Piping.
B. Section 224000 - Plumbing Fixtures.
C. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
B. ASME A112.6.3 - Floor and Trench Drains; 2019.
C. ASSE 1019 - Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance; 2011 (Reaffirmed 2016).
D. NSF 61 - Drinking Water System Components - Health Effects; 2023, with Errata.
E. NSF 372 - Drinking Water System Components - Lead Content; 2022.

1.04 SUBMITTALS

A. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
B. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.
C. Manufacturer's Instructions: Indicate Manufacturer's Installation Instructions: Indicate assembly and support requirements.
D. Manufacturer's qualification statement.
E. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept specialties on site in original factory packaging. Inspect for damage.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.02 DRAINS

A. Manufacturers:
   1. Jay R. Smith Manufacturing Company: www.jrsmith.com/#sle.
   2. Josam Company: www.josam.com.
   3. Zurn Industries, LLC: www.zurn.com.
   4. Wade: www.wadedrains.com
   5. Watts Drainage: www.watts.com
B. Floor Drains:
   1. ASME A112.6.3; lacquered cast iron two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable nickel-bronze or 304 stainless steel strainer.

2.03 CLEANOUTS

A. Manufacturers:
   1. Jay R. Smith Manufacturing Company: www.jrsmith.com.
   2. Josam Company: www.josam.com.
   3. MIFAB, Inc: www.mifab.com/#sle.
   4. Zurn Industries, LLC: www.zurn.com.
   5. Wade: www.wadedrains.com
   6. Watts Drainage: www.watts.com
B. Cleanouts at Exterior Surfaced Areas:
   1. Round cast nickel bronze or stainless steel access frame and non-skid cover.
C. Cleanouts at Interior Finished Floor Areas:
   1. Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round gasketed scored cover in service areas and round gasketed depressed cover to accept floor finish in finished floor areas.
D. Cleanouts at Interior Finished Wall Areas:
   1. Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.
E. Cleanouts at Interior Unfinished Accessible Areas: Calked or threaded type. Provide bolted stack cleanouts on vertical rainwater leaders.

2.04 REFRIGERATOR VALVE AND RECESSED BOX

A. Box Manufacturers:
   1. IPS Corporation/Water-Tite: www.ipscorp.com.
   2. Oatey Supply Chain Services, Inc: www.oatey.com.
B. Description: Plastic preformed rough-in box with brass valves with wheel handle, slip in finishing cover.

2.05 MIXING VALVES

A. Thermostatic Mixing Valves:
   1. Manufacturers:
      a. Leonard Valve Company: www.leonardvalve.com.
      b. Lawler

2. Valve: Chrome plated cast brass body, stainless steel and copper sensing device, integral temperature adjustment. Valve shall be ASSE 1017 Approved. For central system mixing valves system shall be hi/low type capable of .5 gpm minimum flow.
3. Accessories:
    a. Check valve on inlets.
    b. Volume control shut-off valve on outlet.
    c. Stem thermometer on outlet.
    d. Strainer stop checks on inlets.
4. Cabinet: 16 gauge, 0.0598 inch prime-coated steel, for recessed mounting with keyed lock.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with teflon based pipe sealant. Ensure clearance at cleanout for rodding of drainage system.
C. Encase exterior cleanouts in concrete flush with grade.
D. Install floor cleanouts at elevation to accommodate finished floor.
E. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibbs.
F. Pipe relief from backflow preventer to nearest drain.

END OF SECTION

SECTION 224000 - PLUMBING FIXTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall hung, flush valve water closets
B. Urinals
C. Wall hung lavatories
D. Sinks
E. Electric water coolers with bottle fillers
F. Wall-hung multistation lavatory units

1.02 RELATED REQUIREMENTS

A. Section 221005 - Plumbing Piping.
B. Section 221006 - Plumbing Piping Specialties.
C. Section 223000 - Plumbing Equipment.
D. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
B. ASHRAE Std 18 - Methods of Testing for Rating Drinking-Water Coolers with Self-Contained Mechanical Refrigeration; 2008 (Reaffirmed 2013).
C. ASME A112.6.1M - Floor-Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use; 1997 (Reaffirmed 2017).
D. ASME A112.18.1 - Plumbing Supply Fittings; 2018, with Errata.
E. ASME A112.18.9 - Protectors/Insulators for Exposed Waste and Supplies on Accessible Fixtures; 2011 (Reaffirmed 2022).
F. ASME A112.19.1M - Enameled Cast Iron Plumbing Fixtures; The American Society of Mechanical Engineers; 2008 (R2011).
G. ASME A112.19.2 - Ceramic Plumbing Fixtures; 2018, with Errata.
H. ASME A112.19.3 - Stainless Steel Plumbing Fixtures; 2022.
I. ASME A112.19.5 - Flush Valves and Spuds for Water Closets, Urinals, and Tanks; 2022.
J. ASSE 1070 - Performance Requirements for Water Temperature Limiting Devices; 2020.
K. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.
L. ASTM C1822 - Standard Specification for Insulating Covers on Accessible Lavatory Piping; 2021.
M. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
N. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).
O. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
P. NSF 61 - Drinking Water System Components - Health Effects; 2023, with Errata.
Q. NSF 372 - Drinking Water System Components - Lead Content; 2022.
R. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 SUBMITTALS

A. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
B. Manufacturer's Instructions: Indicate installation methods and procedures.
C. Maintenance Data: Include fixture trim exploded view and replacement parts lists.
D. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept fixtures on-site in factory packaging. Inspect for damage.
B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.07 WARRANTY

A. Provide five year manufacturer warranty for electric water cooler.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.
B. Water Efficiency: EPA WaterSense label is required for all water closets, urinals, lavatory faucets, and showerheads.

2.02 REGULATORY REQUIREMENTS

A. Comply with applicable codes for installation of plumbing systems.
B. Comply with UL (DIR) requirements.
C. Perform work in accordance with local health department regulations.

2.03 SPECIFIC PRODUCT INFORMATION

A. Refer to plumbing fixture schedule on the Drawings for specific requirements for each fixture.

2.04 FLUSH VALVE WATER CLOSETS

A. Water Closets:
    1. Vitreous china, ASME A112.19.2, wall hung, siphon jet flush action, china bolt caps.
    2. Flush Valve: Exposed (top spud).
    3. Flush Operation: Sensor operated.
    4. Handle Height: 44 inches or less.
    5. Manufacturers:
        a. American Standard, Inc.;. www.americanstandard-us.com
        b. Gerber Plumbing Fixtures LLC: www.gerberonline.com.

c. Mansfield: www.mansfieldplumbing.com
d. Kohler Company: www.kohler.com.

B. Flush Valves:
1. Manufacturers:
a. Zurn Industries, LLC: www.zurn.com/#sle.
2. Exposed Type: Chrome-plated, escutcheon, integral screwdriver stop.
3. ASME A112.18.1M; exposed chrome plated, diaphragm type with oscillating handle, escutcheon, seat bumper, integral screwdriver stop and vacuum breaker; maximum 1.6 gallon flush volume.
4. ASME A112.18.1; exposed chrome plated, diaphragm type with battery operated solenoid operator, infrared sensor and over-ride button in chrome plated plate, wheel handle stop and vacuum breaker; maximum 1.6 gallon flush volume.

C. Toilet Seats:
1. Manufacturers:
a. Bemis Manufacturing Company: www.bemismfg.com.
b. Church Seat Company: www.churchseats.com.
c. Olsonite: www.olsonite.com.
2. Solid white plastic, open front, self-sustaining hinge, without cover. Seat shall have a stainless hinge and hardware, (hinge posts, washers, nuts). Seat shall have antimicrobial agents.

D. Water Closet Carriers:
1. Manufacturers:
a. Jay R. Smith Manufacturing Company: www.jrsmith.com/#sle.
b. JOSAM Company: www.josam.com.
c. Zurn Industries, Inc: www.zurn.com.
d. Wade: www.wade.com
e. Mifab Manufacturing, Inc.: www.mifab.com
f. Watts Drainage: www.watts.com
2. ASME A112.6.1M; adjustable cast iron frame, integral drain hub and vent, adjustable spud, lugs for floor and wall attachment, threaded fixture studs with nuts and washers.

2.05 WALL HUNG URINALS

A. Manufacturers:
1. American Standard, Inc: www.americanstandard-us.com/#sle.
2. Gerber Plumbing Fixtures LLC: www.gerberonline.com/#sle.
3. Mansfield: www.mansfieldplumbing.com
4. Kohler Company: www.kohler.com.

B. Vitreous china, ASME A112.19.2, wall hung with side shields and concealed carrier.
1. Flush Style: Washout.
2. Flush Valve: Exposed (top spud).
3. Flush Operation: Sensor operated.
4. Trapway Outlet: Integral.
5. Removable stainless steel strainer.

C. Flush Valves:
1. Manufacturers:

a. Zurn Industries, Inc: www.zurn.com.
b. ASME A112.18.1M; exposed chrome plated, diaphragm type with battery operated solenoid operator, infrared sensor and over-ride button in chrome plated plate, wheel handle stop and vacuum breaker; maximum 1 gallon flush volume.

D. Urinal Carriers:
1. Manufacturers:
a. Jay R. Smith Manufacturing Company: www.jrsmith.com/#sle.
b. JOSAM Company: www.josam.com.
c. Zurn Industries, Inc: www.zurn.com.
d. Wade: www.wade.com.
e. Mifab Manufacturing, Inc.: www.mifab.com
f. Watts Drainage: www.watts.com.
2. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded fixture studs for fixture hanger, bearing studs.

2.06 LAVATORIES

A. Manufacturers:
1. American Standard, Inc: www.americanstandard-us.com.
2. Mansfield: www.mansfieldplumbing.com
3. Kohler Company: www.kohler.com.

B. Wall-Hung Basin:
1. Vitreous China, Grade A: ASME A112.19.2; white, rectangular commercial-grade sink with predrilled holes, rear-center drain, front overflow, and hanger. Size as indicated on drawings with 4-inch centerset spacing.
2. Carrier:
a. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded studs for fixture hanger, bearing plate and studs.
b. Manufacturers:
1) Jay R. Smith MFG. Co: www.jrsmith.com/#sle.
2) JOSAM Company: www.josam.com/#sle.
3) Zurn Industries, LLC: www.zurn.com/#sle.

C. Supply Faucet:
1. Deck Mounted Faucet Manufacturers:
a. Chicago Faucet; www.chicagofaucets.com

D. Sensor Operated Faucet:
1. Cast brass, chrome plated, deck mounted with sensor located on neck of spout.
2. Spout Style: Standard.
3. Power Supply:
a. Wireless:
1) Battery: Replaceable alkaline or lithium type with 200,000 cycles, minimum.
2) Low Battery Warning: Provide red or yellow colored indicator to light periodically at 30 days of remaining capacity and continuously 2 weeks prior to get fully discharged.
4. Water Supply: 3/8 inch compression connections.

5. Aerator: Vandal resistant, 0.5 gpm, laminar flow device.
6. Automatic Shut-off: 30 seconds.
7. Sensor Range: Automatically adjusts.
    a. Accessory: Optional remote reprogrammer module to adjust pre-set factory functions.
8. Finish: Polished chrome.
9. Accessory: 4 inch deck plate.
10. Lead Content: Extra low; maximum 0.25 percent by weighed average.

E. Thermostatic Mixing Valve:
1. ASSE 1070 listed with combination stop, strainer, and check valves, and flexible stainless steel connectors.

F. Accessories:
1. Chrome plated 17 gage casted brass body P-trap with clean-out plug and arm with a deep brass wall flange. Center to center dimension shall be 12".

G. Lavatory Carrier:
1. Manufacturers:
    a. Jay R. Smith Manufacturing Company: www.jrsmith.com/#sle.
    b. JOSAM Company: www.josam.com/#sle.
    c. Zurn Industries, LLC: www.zurn.com/#sle.
2. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded studs for fixture hanger, bearing plate and studs.

H. Accessories:
1. Offset waste with perforated open strainer.
2. Rigid supplies.
3. Provide loose key operated heavy pattern stops, brass stems and EPDM washers.
4. Lavatory faucets to be provided with a point of use ANSI/NSF61 certified thermostatic valve equal to a Leonard 210 or 220 series unless noted otherwise.

2.07 WALL-HUNG, SOLID SURFACE, MULTISTATION LAVATORY UNITS

A. Description: Rectilinear, level-surface deck, seamless and integral elongated basin, with stainless steel enclosed pedestal cabinet.

B. Deck and Bowl Material: Fabricate from molded engineered stone material consisting of natural quartz, granite, and other minerals in a matrix of thermoset acrylic modified bio-based polyester resin and meeting requirements of IAPMO Z124.

C. Surface Burning Characteristics: Smoke developed index less than 450, and flame spread index less than 25, Class A, when tested in accordance with ASTM E84.

D. Soap Dispenser:
1. Deck-mounted, sensor-operated, chrome-plated plastic, with LED battery and soap level indicators, battery box and batteries and 27 ounce (798 ml) bottle of 1000 shot soap.

E. Water Supply: Thermostatic mixing valve assembly.

F. Color: As selected by Architect from manufacturer's full line.

G. Sensor-Operated Faucets:
1. High profile metering faucet with infrared and external temperature control.
2. Vandal-resistant meeting requirements of ASME A112.18.1 and ADA Standards compliant.

3. Body: Polished, chrome-plated commercial solid cast brass, with 4 inch (102 mm) centerset mounting with anti-rotation trim plate.
4. Tempered Water Supply: ADA Standards compliant lever on faucet body.
5. Aerator: Flow rate of 0.5 gpm at 20 to 80 psi operating range.
6. Sensor Module: Water conserving, vandal-resistant adjustable sensor unit with timing turn-off delay and stationary object automatic timed cutoff, with battery diagnostic light, serviceable from above deck.
7. Power Supply: 6 VDC lithium battery and single 115 VAC plug-in adapter.
8. Thermostatic Mixing Valve:
    a. ASSE 1070 listed with combination stop, strainer, and check valves, and flexible stainless steel connectors.

H. Access Panel: Stainless steel.
I. Support Frame: Wall-mounted, heavy gauge, stainless steel.
J. Manufacturers:
1. Bradley Corporation: www.bradleycrp.com/#sle.

2.08 SINKS

A. Manufacturers:
1. Eljer.
2. Elkay: www.elkay.com.

B. Bowl
1. ASME A112.19.3; 18 gage, Type 302 stainless steel, self rimming and undercoated, with ledge back drilled for trim.

C. Trim: ASME A112.18.1M; chrome plated brass supply with high rise swing spout, vandal proof water economy aerator with maximum 2.2 gallons flow, indexed lever handles.
D. Supply faucets
1. Manufacturers:
    a. Chicago Faucets: www.chicagofaucets.com.

E. Accessories:
1. Chrome plated 17 gage brass P-trap with clean-out plug and arm with escutcheon
2. Loose key operated, heavy pattern stops with brass stems and EPDM washers, rigid supplies.
3. Rigid supplies.
4. Sink faucets to be provided with a point of use ANSI/NSF61 certified thermostatic valve equal to a Leonard 210 or 220 series unless noted otherwise.

2.09 UNDER-LAVATORY PIPE SUPPLY COVERS

A. General:
1. Insulate exposed drainage piping including hot, cold and tempered water supplies under lavatories or sinks per ADA Standards.
2. Adhesives, sewing threads and two ply laminated materials are prohibited.
3. Exterior Surfaces: Smooth nonabsorbent with no finger recessed indentations for easy cleaning.
4. Construction: 1/8 inch PVC with antimicrobial, antifungal and UV resistant properties.
    a. Provide one piece injected molded design with internal bridge at top of J-bend to prevent separating.

b. Comply with ASTM E84 for flame and smoke development.
c. Comply with ASTM C1822 Type III for covers on accessible lavatory piping.
d. Comply with ASME A112.18.9 for covers on accessible lavatory piping.
e. Comply with ICC A117.1.
f. Thermal Conductivity: K value of 0.358 or density of 21.61 pcf per ASTM C518.
g. Microbial and Fungal Resistance for Interior and Exterior: Comply with ASTM G21.

5. Color: High gloss white.
6. Fasteners: Reusable, snap-locking fasteners with no sharp or abrasive external surfaces. No cable ties allowed.

2.10 ELECTRIC WATER COOLERS

A. Manufacturers:
1. Elkay Manufacturing Company: www.elkay.com.
2. Haws Corporation: www.hawsco.com.
3. Oasis, a Lynn Tilton Company: www.oasiscoolers.com
4. ARI 1010; surface handicapped mounted electric water cooler with bottle filler and stainless steel top, stainless steel body, elevated anti-squirt bubbler with stream guard keyed into place on basin, automatic stream regulator, front and side push bars, integral drain with no exposed fasteners, mounting bracket, refrigerated with integral air cooled condenser and stainless steel grille. Bottle Filler shall include an electronic sensor for touchless activation with an automatic 20 second shut off timer. Bottle filler shall provide 1.1-1.5 gpm flow rate with laminar flow to minimize splashing. System shall be ADA adult and child compliant.
5. Capacity: 8 gph of 50 degrees F water with inlet at 80 degrees F and room temperature of 90 degrees F, when tested in accordance with ASHRAE Std 18.
6. Bottle Filler: Materials to match fountain.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
B. Verify that electric power is available and of the correct characteristics.
C. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.02 PREPARATION

A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.03 INSTALLATION

A. Install each fixture with trap, easily removable for servicing and cleaning.
B. Provide chrome-plated rigid or flexible supplies to fixtures with loose key stops, reducers, and escutcheons.
C. Install components level and plumb.
D. Install and secure fixtures in place with wall supports and bolts.

E. Install air chambers on hot and cold water supply piping to each fixture. Air chambers shall be 12" high minimum and shall be same size as piping feeding fixture.

3.04 INTERFACE WITH WORK OF OTHER SECTIONS

A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.05 ADJUSTING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.06 CLEANING

A. Clean plumbing fixtures and equipment.

3.07 SCHEDULES

A. Fixture Heights: Install fixtures to heights as indicated on the Architectural Drawings.

B. Fixture Rough-In

1. Refer to Drawings for additional information.

END OF SECTION

SECTION 230510 - BASIC MECHANICAL REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this and all other sections in Division 23.

1.02 WORK INCLUDES

A. Scope: Provide the basic items, articles, materials, operations, and methods required by the Drawings and Specifications, including labor, equipment, supplies, and incidentals necessary for completion of Mechanical work.

B. Drawings: The Drawings show the general arrangement of equipment, but due to their small scale are essentially diagrammatic and do not detail every point at which conflicts of construction may occur. Should conditions necessitate any deviation from the general layout shown on the Drawings or if such deviations are more advantageous, the Contractor shall submit Drawings to the Architect for review showing the proposed method of installation. If such changes are accepted, they shall become part of the Contract to which it is applied.

1.03 SCOPE OF WORK

A. Furnish and install stainless steel condensing boilers.

B. Provide hydronic specialties such as air vents, strainers, combination fittings, flow controls, and relief valves.

C. Provide air cooled water chiller(s) with remote evaporator and all associated components.

D. Furnish and install all hydronic system hot and chilled water lines and insulation.

E. Provide refrigerant piping and all associated insulation and components.

F. Furnish and install all gas piping.

G. Provide ductless split system air conditioning units.

H. Clean and flush all hot and chilled water lines, provide chemical treatment for all systems affected by this Project.

I. Furnish and install boiler flues.

J. Provide all supply, return, and exhaust ductwork.

K. Provide all ductwork insulation.

L. Provide all diffusers, grilles, and registers.

M. Provide complete temperature control system and all associated valves, dampers, sensors, wells and related equipment.

N. Provide complete test and balance of all air handling and hydronic systems.

O. Provide all other equipment and devices shown on the Drawings. This shall include all ancillary devices, wiring and associated components for the proper operation of all equipment installed or affected by this Project.

1.04 STANDARDS AND REGULATIONS

A. The work under the mechanical sections shall comply with the latest edition of the applicable standards and codes of the following:

1. ASME-American Society of Mechanical Engineers

2. ASHRAE-American Society of Heating, Refrigeration and Air Conditioning Engineers
3. ARI-Air Conditioning and Refrigeration Institute
4. ASTM-American Society for Testing Materials
5. ASA-American Standards Association
6. AWWA-American Water Works Association
7. NBFU-National Board of Fire Underwriters
8. AMCA-Air Moving and Conditioning Association
9. IBR-Institute of Boiler and Radiator Manufacturers
10. UL-Underwriters' Laboratories
11. NEMA-National Electric Manufacturers Association
12. NFPA #101-Current Edition Life Safety code
13. National Building Code
14. Illinois State Plumbing Code, Current Edition
15. Illinois Rules & Regulations for Fire Prevention and Safety
16. National, State and Local Building Codes
17. International Building Code

B. Include all items of Labor and Material required to comply with such codes in accordance with Section "GENERAL CONDITIONS" Standards and Regulations, Article "Permits, Laws and Regulations". Where quantities, sizes or other requirements indicated on the drawings or herein specified are in excess of the Code requirements, the Specifications and/or Drawings shall govern regardless of the Code requirements.

1.05 SHOP DRAWINGS

A. Submit the following shop drawings and data sheets to the Architect for review.
1. Manufacturer's Drawings and performance data on all equipment.
2. Provide minimum 1/8" = 1'-0" scale Shop Drawings for all ductwork and piping systems.
3. Dimensioned Drawings showing all required openings.
4. Dimensioned Drawings of all equipment rooms, including exact equipment locations.
5. Provide installation elevations for all equipment, piping, etc.
6. Additional Shop Drawing requirements may be found in other section of this Specification.

B. The Contractor shall be responsible for all equipment fitting into the spaces allocated on the plans for such equipment. This shall include any Work required to move the equipment to the spaces shown on the Drawings.

C. When Shop Drawings are resubmitted after having been returned for correction, only the changes noted on the previously reviewed Drawings will be checked by the Architect on the resubmitted shop drawings. If additional changes, other than those previously noted, are made on the resubmitted Drawings, the Contractor shall notify the Architect in writing of such additional changes.

D. Any materials installed prior to shop drawing review will be considered a mock up and may be changed without additional cost at the Architect's direction.

1.06 "RECORD" DRAWINGS

A. At the completion of the work, the Contractor shall provide to the Architect complete drawings pertaining to the Work, showing all equipment, pipe, ducts, outlets, etc., as actually installed with accurate dimensions locating all runs and branches. The Drawings shall be in electronic

format -Autocad version 14 or newer and are not to be hand drawn on copies of the original Contract Drawings. Drawings are to be furnished as a minimum of (2) black line plots along with a CD-ROM with electronic drawing files.

1.07 COOPERATION BETWEEN TRADES

A. Each Subcontractor shall cooperate with all other Subcontractors. Each Subcontractor shall check, prior to commencement of work, for space requirements with all other Subcontractors Relocation of ducts, piping, etc., which may alter the architectural or structural construction must be reviewed by the Architect prior to relocation. No extra compensation will be allowed for Work resulting from these changes.

1.08 CARTING AND HANDLING

A. The Contractor shall furnish his own carting, handling and erecting of equipment and/or material included in this Contract.

1.09 DRAWINGS

A. The Drawings and details shall be taken as a diagrammatic means of installing piping, ductwork and other equipment. They are not intended to show every fitting and offset, nor every structural, electrical, piping or ductwork conflict that may be encountered during the installation of the Work. The Contractor shall be responsible to provide all additional duct or pipe fittings required to install the Work shown on the Drawings.

B. Consult all other Drawings included as part of this Project. The Drawings show the general arrangement of all piping, conduit and equipment. Examine the Drawings and Specifications carefully and notify the Architect by letter of any discrepancies so same can be rectified at the earliest possible date. The Contractor shall follow the Drawings as closely as possible for installation of all piping, ductwork and equipment.

C. The Contractor shall coordinate his work with all architectural, structural, electrical and mechanical features of the building.

D. Should conditions necessitate any rearrangement of piping, ductwork or equipment, or if same can be run to better advantage, the Contractor shall prepare and submit Drawings showing the changes before proceeding with the Work. If such changes are accepted, they shall become a part of this Contract after their approval.

E. Due to the small scale of the Drawings, it is not possible to show all offsets, and detail every point at which exigencies of construction may require special attention. Additional fittings, valves, traps, vacuum breakers, ducts, and other appurtenances necessary due to field conditions or Code requirements shall be furnished and installed by the Contractor at no additional cost to the Owner.

1.10 SITE AND JOB CONDITIONS

A. The Contractor shall review all other Drawings and coordinate the Work with same. No additional compensation shall be allowed for changes to adapt Work to coordinate with Work shown on other Drawings.

B. All dimensions, locations of equipment and connections to external utilities shall be reviewed in field prior to construction. The Architectural plans will hold precedence over mechanical plans as to location of partitions, etc. All construction dimensions shall be coordinated with the Architectural Drawings where discrepancies may exist.

1.11 MODIFICATIONS TO EXISTING EQUIPMENT

A. All existing equipment including piping and ductwork affected by this Project shall be treated as new.
B. The Contractor shall be responsible to provide new insulation and hangers for all existing equipment, piping and ductwork to remain.
C. Existing insulation and hangers may remain if the insulation and hangers comply fully with all provisions of the Project Manual and Contract Drawings.
D. The Contractor shall be responsible to provide new belts and sheaves for existing equipment as required to provide the airflow quantities shown on the Drawings for each piece of existing equipment.
E. The Contractor shall be responsible for all modifications required for all existing pumps to provide the water flow quantities shown on the Drawings. These modifications shall include, but shall not be limited to, replacement or modifications of existing impellers and replacement of all gaskets and seals required to modify the existing pumps.
F. All existing refrigeration equipment affected by this project shall be modified and or removed in conformance with all applicable Codes and Regulations. All refrigerant in such units shall be reclaimed and reused or properly disposed.

1.12 INSTALLATION OF EQUIPMENT

A. The Contractor shall be responsible to install all equipment as per the Manufacturer's written recommendations.
B. Due to the small scale of the drawings, not all devices and appurtenances can be shown on the Contract Documents. The Contractor shall include all devices, piping, wiring and other equipment required for a fully functional installation.
C. The Contractor shall be responsible to provide piping diagrams and all other required site specific information to the Equipment Manufacturer for review prior to installation of the equipment or any of the associated piping or devices.
D. All devices requiring service shall be installed in accessible locations. Access shall be provided at all control valves, isolation valves, control devices and panels, damper operators and motors. All such devices installed above suspended acoustical ceilings with removable pads shall be oriented such that the Manufacturer's recommended clearances are met. The Contractor shall provide access panels at all devices installed above all other ceilings, behind casework and in all other inaccessible locations. The minimum size of the access panels shall be 18"x18". Access panels shall be fire rated where installed in fire rated construction. Color of panels shall be as selected by the Architect.
E. The Contractor shall be responsible to provide all modifications to all equipment required to connect the equipment to the required electrical feeds. These modifications shall include, but shall not be limited to, replacement of wiring lugs required to fit power or control wiring and the installation of additional wiring or conduits.
F. Any modifications to the Work shown on the Contract Documents (including, but not limited to, additional devices, modifications to electrical feeds or modifications to piping sizes) required by the Equipment Manufacturer shall be provided by the Contractor. No additional compensation will be allowed for any modifications required by the Manufacturer for a fully functional installation.

1.13 FLOOR AND WALL PENETRATIONS

A. All floor and wall penetrations for all equipment including ductwork, piping, conduit, etc. shall be sealed. Sealant used shall be applied to both sides of penetration.
B. Rating of sealant used shall meet or exceed the UL fire rating of the floor or wall assembly.
C. Sealants shall remain flexible throughout the entire temperature and expansion range of the affected system.
D. All sealants used shall be fully plenum rated and shall have a flame spread rating of less than 25 and a smoke developed rating of not more than 50.
E. Insulation, where applied, shall be continuous through wall or floor penetration. Insulation thickness and vapor barrier integrity shall also remain continuous through penetration.

1.14 EQUIPMENT BASES

A. Provide concrete pads for all floor mounted equipment.
B. Concrete pads shall be 6" larger in all directions than equipment to be supported.
C. Pour pad such that top is level in all directions.
D. Provide 6"x6" welded wire fabric installed in center of pour.
E. Pad thickness shall be as indicated on the Drawings.

1.15 PIPE PORTALS

A. Provide 18" high roof curbs sized as required for all roof piping penetrations. Curb shall be insulated and shall be complete with cant strips at base and pressure traeated nailing strip.
B. Curb shall be sized as required to accept all piping and conduits.
C. Provide pipe portal mounted atop roof curb. Portal shall be as manufacturered by Thybar or equal.

1.16 ACCEPTABLE BASE BID MANUFACTURERS

A. The Contract Documents have been prepared for the installation of the equipment scheduled on the Drawings. Acceptable Base Bid Manufacturers have been included in the Project Manual.
B. The Contractor shall be responsible to provide all modifications to the Work shown on the Drawings required for the installation of equipment provided by the Acceptable Base Bid Manufacturers. These modifications shall include, but shall not be limited to, electrical feeds, pipe sizes, support structure, etc.
C. All required modifications shall be coordinated by the Contractor prior to submitting the Bid. No additional compensation shall be allowed for any changes to the Work shown on the Drawings required for any equipment provided by an Acceptable Base Bid Manufacturer.

1.17 MINIMUM EFFICIENCY REQUIREMENTS

A. All new mechanical equipment shall be in conformance with all requirements of the latest edition of ASHRAE 90.1. Provide Manufacturer's certification for review prior to purchase of any equipment.
B. All materials (ductwork, piping, insulation, etc.) shall be installed in conformance with the 2024 version of the International Energy Code.

1.18 PROTECTION

A. The Contractor shall keep all pipe and duct openings closed by means of plugs or caps to prevent entrance of foreign matter and shall cover all fixtures, equipment and apparatus as

required to protect them against dirt, water, chemical or mechanical damage before, during and after installation. Any such fixtures, equipment or apparatus damaged prior to final acceptance of the Work shall be restored to its original condition or replaced by the Contractor.

1.19 JURISDICTION OF WORK

A. Whenever it becomes necessary for a Subcontractor to furnish Labor and Materials other than that which is generally accepted by trade agreement or general practices to belong to his particular trade or branch of work, he shall Subcontract such work or branch of work involved.
B. However, if there is an overlapping of trades, practices or trade agreements and a jurisdictional dispute arises to claims of tradesmen of another Subcontractor, and a trade union settlement is made in favor of these tradesmen who claimed the work, he shall perform it at his own expense as if it has been included in his Work. All such Work shall be executed in such a manner that there will be no delay or stoppage of work due to infringement or alleged infringement of trade agreements as to jurisdiction.

1.20 CLEANING

A. The Contractor shall clean premises of all excess construction material and debris caused by the Work at the completion of the Work or at the direction of the Owner, Architect or Owner's agent during the course of the Project. All equipment provided by the Contractor shall be thoroughly washed down prior award of Substantial Completion.

1.21 INSTRUCTIONS AND TRAINING

A. The Contractor shall instruct the Owner's personnel in the operation and maintenance of equipment installed as part of this Project. In addition, the Contractor shall furnish to the Owner three (3) sets of typewritten instructions. The Contractor shall also furnish to the Owner three (3) sets of equipment maintenance and operations manuals for each item of equipment.
B. In addition to written instructions the Contractor shall provide field instruction as follows.
    1. Mechanical (excluding Temperature Controls), 4 sessions for a total of 16 hours
    2. Temperature Controls, Refer to section 230923.
C. Notify the Architect seven days in advance of all instruction sessions so the Architect can coordinate with the Owner and be present.
D. For each session, the Contractor shall submit a training session log prepared by the Contractor and signed by the Owner and the Contractor. The log shall certify that the above has been satisfactorily completed and that the Owner's copies of manuals and written instruction were on hand at the time of the session.
E. All training sessions shall be video taped and two copies shall be provided to the Owner.
F. The training sessions shall be coordinated by the Contractor with all Subcontractors to avoid numerous trips by the Owner.

1.22 WARRANTY

A. All work shall be guaranteed for two years after Substantial Completion and final acceptance against all defects of material, equipment and workmanship. All defects appearing within two years shall be promptly remedied without further cost to the Owner.
B. All equipment shall be guaranteed to meet specified capacities and to operate within limits of noise level and vibration recommended in the current issue of the ASHRAE Guide and Data Book.
C. Any portion or the work performed by the Contractor that fails within the warranty period shall be repaired or replaced by the Contractor without additional cost to the Owner.

D. Additional specific warranties may be found in other sections of this Specification.
E. Refer to temperature control and electrical specifications for additional specific warranties.

1.23 SYSTEM STARTUP AND COMPLETION

A. The Contractor shall be responsible for startup of the Mechanical Systems as described below.
   1. All strainers shall be cleaned and the pumps shall be checked for proper alignment.
   2. All chemical treatment as well as piping cleaning shall be performed and certified analysis reports provided.
   3. All air filters on the units shall be changed before the testing and balancing is done.
   4. All fire dampers must be tested and inspected.
   5. All equipment shall be checked for proper operation.
B. At the completion of Startup, the Contractor shall submit start up reports for each piece of equipment. The reports shall include the condition of equipment and inlet and outlet temperatures and flow rates for all applicable fluids.

END OF SECTION

SECTION 230513 - MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General construction and requirements.
B. Applications.
C. Single phase electric motors.
D. Three phase electric motors.

1.02 RELATED REQUIREMENTS

A. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings; 2015 (Reaffirmed 2020).
B. IEEE 112 - IEEE Standard Test Procedure for Polyphase Induction Motors and Generators; 2017.
C. NEMA MG 00001 - Motors and Generators; 2024.
D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

A. Product Data: Provide wiring diagrams with electrical characteristics and connection requirements.
B. Test Reports: Indicate test results verifying nominal efficiency and power factor for three phase motors larger than 1/2 horsepower.
C. Manufacturer's Installation Instructions: Indicate setting, mechanical connections, lubrication, and wiring instructions.
D. Operation Data: Include instructions for safe operating procedures.
E. Maintenance Data: Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

1.05 QUALITY ASSURANCE

A. Comply with NFPA 70.
B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Leeson Electric Corporation: www.leeson.com.

B. Regal-Beloit Corporation (Century): www.centuryelectricmotor.com.
C. General Electric
D. Century E +3 High Efficiency

2.02 GENERAL CONSTRUCTION AND REQUIREMENTS

A. Nominal Efficiency:
   1. All motors 1.0 horsepower and larger shall be Premium Efficiency type in accordance with NEMA MG 1.
   2. All motors less than 1.0 horsepower shall be externally commutated or shall have a miinimum motor efficiency of 70% rated in accordance with DOE 10 CFR 431.
B. Construction:
   1. Open drip-proof type except where specifically noted otherwise.
   2. Design for continuous operation in 104 degrees F environment.
   3. Design for temperature rise in accordance with NEMA MG 00001 limits for insulation class, service factor, and motor enclosure type.
C. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.
D. Wiring Terminations:
   1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
   2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

2.03 APPLICATIONS

A. Exception: Motors less than 250 watts, for intermittent service may be the equipment manufacturer's standard and need not comply with these specifications.
B. Single phase motors for centrifugal pumps: Split phase type.
C. Single phase motors for shaft mounted fans or blowers: Permanent split capacitor type.
D. Motors located in exterior locations and air cooled condensers: Totally enclosed type.
E. Motors located in outdoors: Totally enclosed weatherproof epoxy-treated type.

2.04 SINGLE PHASE POWER - SPLIT PHASE MOTORS

A. Starting Torque: Less than 150 percent of full load torque.
B. Starting Current: Up to seven times full load current.
C. Breakdown Torque: Approximately 200 percent of full load torque.

2.05 SINGLE PHASE POWER - PERMANENT-SPLIT CAPACITOR MOTORS

A. Starting Torque: Exceeding one fourth of full load torque.
B. Starting Current: Up to six times full load current.
C. Multiple Speed: Through tapped windings.
D. Open Drip-proof or Enclosed Air Over Enclosure: Class A (50 degrees C temperature rise) insulation, minimum 1.0 Service Factor, prelubricated sleeve or ball bearings, automatic reset overload protector.

2.06 THREE PHASE POWER - SQUIRREL CAGE MOTORS

A. Starting Torque: Between 1 and 1-1/2 times full load torque.
B. Starting Current: Six times full load current.
C. Power Output, Locked Rotor Torque, Breakdown or Pull Out Torque: NEMA Design B characteristics.
D. Design, Construction, Testing, and Performance: Comply with NEMA MG 00001 for Design B motors.
E. Insulation System: NEMA Class B or better.
F. Testing Procedure: In accordance with IEEE 112. Load test motors to determine free from electrical or mechanical defects in compliance with performance data.
G. Motor Frames: NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.
H. Thermistor System (Motor Frame Sizes 254T and Larger): Three PTC thermistors embedded in motor windings and epoxy encapsulated solid state control relay for wiring into motor starter; refer to Section 262913.
I. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum ABMA STD 9, L-10 life of 20,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.
J. Sound Power Levels: To NEMA MG 00001.
K. Part Winding Start Where Indicated: Use part of winding to reduce locked rotor starting current to approximately 60 percent of full winding locked rotor current while providing approximately 50 percent of full winding locked rotor torque.
L. Weatherproof Epoxy Sealed Motors: Epoxy seal windings using vacuum and pressure with rotor and starter surfaces protected with epoxy enamel; bearings double shielded with waterproof non-washing grease.
M. Nominal Efficiency: As indicated at full load and rated voltage when tested in accordance with IEEE 112.
N. Nominal Power Factor: As indicated at full load and rated voltage when tested in accordance with IEEE 112.
O. Shaft Grounding: Provide shaft grounding rings or brushes for all motors for use with variable frequency drives.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.
C. Check line voltage and phase and ensure agreement with nameplate.

END OF SECTION

SECTION 230516 - EXPANSION FITTINGS AND LOOPS FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flexible pipe connectors.
B. Expansion joints and compensators.
C. Pipe loops, offsets, and swing joints.

1.02 RELATED REQUIREMENTS

A. Section 232113 - Hydronic Piping.

1.03 REFERENCE STANDARDS

A. EJMA (STDS) - EJMA Standards; Tenth Edition.

1.04 SUBMITTALS

A. Product Data:
   1. Flexible Pipe Connectors: Indicate maximum temperature and pressure rating, face-to-face length, live length, hose wall thickness, hose convolutions per foot and per assembly, fundamental frequency of assembly, braid structure, and total number of wires in braid.
   2. Expansion Joints: Indicate maximum temperature and pressure rating, and maximum expansion compensation.
B. Design Data: Indicate selection calculations.
C. Project Record Documents: Record installed locations of flexible pipe connectors, expansion joints, anchors, and guides.

PART 2 PRODUCTS

2.01 FLEXIBLE PIPE CONNECTORS - STEEL PIPING

A. Manufacturers:
   1. Mercer Rubber Company: www.mercer-rubber.com.
   2. The Metraflex Company: www.metraflex.com/#sle.
B. Inner Hose: Bronze.
C. Exterior Sleeve: Single braided, stainless steel.
D. Pressure Rating: 125 psi and 450 degrees F.
E. End Connections: Flanged.
F. Size: Use pipe sized units.
G. Maximum offset: 3/4 inch on each side of installed center line.

2.02 FLEXIBLE PIPE CONNECTORS - COPPER PIPING

A. Manufacturers:
   1. Mercer Rubber Company: www.mercer-rubber.com.
   2. Metraflex Company: www.metraflex.com.
B. Inner Hose: Bronze.
C. Exterior Sleeve: Braided bronze.

D. Pressure Rating: 125 psi and 450 degrees F.
E. End Connections: Flanged.
F. Size: Use pipe sized units.
G. Maximum offset: 3/4 inch on each side of installed center line.
H. Application: Copper piping.

2.03 ACCESSORIES

A. Pipe Alignment Guides:
   1. Two piece welded steel with enamel paint, bolted, with spider to fit standard pipe, frame with four mounting holes, clearance for minimum 1 inch thick insulation, minimum 3 inches travel.
B. Swivel Joints:
   1. Fabricated steel body, double ball bearing race, field lubricated, with rubber (Buna-N) o-ring seals.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Install in accordance with EJMA (Expansion Joint Manufacturers Association) Standards.
C. Install flexible pipe connectors on pipes connected to vibration isolated equipment. Provide line size flexible connectors.
D. Install flexible connectors at right angles to displacement. Install one end immediately adjacent to isolated equipment and anchor other end. Install in horizontal plane unless indicated otherwise.
E. Anchor pipe to building structure where indicated. Provide pipe guides so movement is directed along axis of pipe only. Erect piping such that strain and weight is not on cast connections or apparatus.
F. Provide support and equipment required to control expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where required.

END OF SECTION

SECTION 230519 - METERS AND GAUGES FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pressure gages and pressure gage taps.
B. Thermometers and thermometer wells.

1.02 RELATED REQUIREMENTS

A. Section 232113 - Hydronic Piping.

1.03 REFERENCE STANDARDS

A. ASME B40.100 - Pressure Gauges and Gauge Attachments; 2022.
B. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers; 2014 (Reapproved 2020).
C. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers; 2014 (Reapproved 2021).

1.04 SUBMITTALS

A. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.
B. Project Record Documents: Record actual locations of components and instrumentation.

1.05 FIELD CONDITIONS

A. Do not install instrumentation when areas are under construction, except for required rough-in, taps, supports and test plugs.

PART 2 PRODUCTS

2.01 PRESSURE GAUGES

A. Manufacturers:
   1. Moeller Instrument Company, Inc: www.moellerinstrument.com.
   2. Miljoco Corporation: www.miljoco.com.
B. Gage: ASME B40.100, UL 393 drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background, bottom connection.
   1. Case: Stainless steel or cast aluminum, acrylic lens.
   2. Connector: Brass, 1/4 inch NPT
   3. Scale: White coated aluminum with permanently etched markings (Psi).
   4. Accuracy: Plus or minus 1 percent of range span.
   5. Range: 2 times operating pressure.
   6. Calibration: Psi and feet (head).
C. Pressure Gage Accessories
   1. Syphon: 1/4" NPT straight coil constructed carbon steel with threads on each end.
   2. Snubber: 1/4" NPT brass bushing with corrosion resistant porous metal disc. Disc material shall be suitable for fluid served and rated pressure.

3. Isolation valve: 1/4" NPT brass ball valve rated for maximum 600 psi.

2.02 STEM TYPE THERMOMETERS

A. Manufacturers:
   1. Weksler Glass Thermometer Corp: www.weksler-gauges.com.
   2. Miljoco Corporation: www.miljoco.com.
B. Thermometer:
   1. Case: 9" die-cast aluminum finished in baked epoxy enamel with shatter-proof polycarbonate lens.
   2. Adjustable joint: Finished to match case, 180 degree adjustment in vertical plane, 360 degree adjustment in horizontal plane, with locking device.
   3. Tube: Non-toxic organic spirit-filled glass tube with magnifying lense.
   4. Scale: Aluminum with white finish and black markings.
   5. Stem: Aluminum or brass.
   6. Calibration: Degrees F.

2.03 THERMOMETER SUPPORTS

A. Thermometer Wells: Brass or stainless steel, pressure rated to match piping system design pressure, with or without extension for insulated piping.
B. Flange: 3 inch outside diameter reversible flange, designed to fasten to sheet metal air ducts, with brass perforated stem.

2.04 TEST PLUGS

A. Test Plug: 1/4 inch or 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with Nordel core for temperatures up to 350 degrees F.
B. Test Kit: Carrying case, internally padded and fitted containing one 2-1/2 inch diameter pressure gauges, one gauge adapters with 1/8 inch probes, two 1 inch dial thermometers.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Install pressure gauges with pulsation dampers. Provide gauge cock to isolate each gauge. Provide siphon on gauges in steam systems. Extend nipples and siphons to allow clearance from insulation.
C. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inch for installation of thermometer sockets. Ensure sockets allow clearance from insulation.
D. Install thermometer sockets adjacent to controls system thermostat, transmitter, or sensor sockets. Refer to Section 230943. Where thermometers are provided on local panels, duct or pipe mounted thermometers are not required.
E. Coil and conceal excess capillary on remote element instruments.
F. Provide instruments with scale ranges selected according to service with largest appropriate scale.
G. Install gauges and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.

H. Adjust gauges and thermometers to final angle, clean windows and lenses, and calibrate to zero.
I. Locate test plugs adjacent thermometers and thermometer sockets.

3.02 SCHEDULE

A. Pressure Gauge Tappings, Location:
   1. Chiller - inlets and outlets.
   2. Boiler - inlets and outlets.
B. Stem Type Thermometers, Location and Scale Range:
   1. Boilers - inlets and outlets, 0 to 220 degrees F.
   2. Chiller - inlets and outlets, 0 to 100 degrees F.

END OF SECTION

SECTION 230523 - GENERAL-DUTY VALVES FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Angle valves.
B. Globe valves.
C. Ball valves.
D. Butterfly valves.
E. Check valves.
F. Gate valves.
G. Chainwheels.

1.02 RELATED REQUIREMENTS

A. Section 230548 - Vibration Isolation.
B. Section 230553 - HVAC Identification.
C. Section 230716 - HVAC Equipment Insulation.
D. Section 230719 - HVAC Piping Insulation.
E. Section 232113 - Hydronic Piping.

1.03 ABBREVIATIONS AND ACRONYMS

A. CWP: Cold working pressure.
B. EPDM: Ethylene propylene copolymer rubber.
C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
D. NRS: Nonrising stem.
E. OS&Y: Outside screw and yoke.
F. PTFE: Polytetrafluoroethylene.
G. RS: Rising stem.
H. TFE: Tetrafluoroethylene.
I. WOG: Water, oil, and gas.

1.04 REFERENCE STANDARDS

A. API STD 594 - Check Valves: Flanged, Lug, Wafer, and Butt-Welding; 2022.
B. ASME B1.20.1 - Pipe Threads, General Purpose, Inch; 2013 (Reaffirmed 2018).
C. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2020.
D. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard; 2020.
E. ASME B16.10 - Face-to-Face and End-to-End Dimensions of Valves; 2022.
F. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.
G. ASME B16.34 - Valves — Flanged, Threaded, and Welding End; 2020.
H. ASME B31.9 - Building Services Piping; 2020.
I. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators; 2023.
J. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2022.

K. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings; 2004 (Reapproved 2019).
L. ASTM A536 - Standard Specification for Ductile Iron Castings; 1984, with Editorial Revision (2019).
M. ASTM A582/A582M - Standard Specification for Free-Machining Stainless Steel Bars; 2021.
N. ASTM B61 - Standard Specification for Steam or Valve Bronze Castings; 2015 (Reapproved 2021).
O. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings; 2017.
P. AWWA C606 - Grooved and Shouldered Joints; 2022.
Q. MSS SP-45 - Drain and Bypass Connections; 2020.
R. MSS SP-67 - Butterfly Valves; 2022.
S. MSS SP-70 - Gray Iron Gate Valves, Flanged and Threaded Ends; 2011.
T. MSS SP-71 - Gray Iron Swing Check Valves, Flanged and Threaded Ends; 2018.
U. MSS SP-72 - Ball Valves with Flanged or Butt-Welding Ends for General Service; 2010a.
V. MSS SP-78 - Gray Iron Plug Valves, Flanged and Threaded Ends; 2011.
W. MSS SP-80 - Bronze Gate, Globe, Angle, and Check Valves; 2019.
X. MSS SP-85 - Gray Iron Globe and Angle Valves, Flanged and Threaded Ends; 2011.
Y. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010, with Errata .
Z. MSS SP-125 - Check Valves: Gray Iron and Ductile Iron, In-Line, Spring-Loaded, Center-Guided; 2018.

1.05 SUBMITTALS

A. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
B. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
C. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.

1.06 QUALITY ASSURANCE

A. Manufacturer:
1. Obtain valves for each valve type from single manufacturer.
2. Company must specialize in manufacturing products specified in this section, with not less than three years of documented experience.
B. Welding Materials and Procedures: Comply with ASME BPVC-IX.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:
1. Minimize exposure of operable surfaces by setting plug and ball valves to open position.
2. Protect valve parts exposed to piped medium against rust and corrosion.
3. Protect valve piping connections such as grooves, weld ends, threads, and flange faces.
4. Adjust globe, gate, and angle valves to the closed position to avoid clattering.
5. Secure check valves in either the closed position or open position.
6. Adjust butterfly valves to closed or partially closed position.
B. Use the following precautions during storage:

1. Maintain valve end protection and protect flanges and specialties from dirt.
    a. Provide temporary inlet and outlet caps.
    b. Maintain caps in place until installation.
2. Store valves in shipping containers and maintain in place until installation.
    a. Store valves indoors in dry environment.
    b. Store valves off the ground in watertight enclosures when indoor storage is not an option.

C. Exercise the following precautions for handling:
1. Handle large valves with sling, modified to avoid damage to exposed parts.
2. Avoid the use of operating handles or stems as rigging or lifting points.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. Listed pipe sizes shown using nominal pipe sizes (NPS) and nominal diameter (DN).
B. Provide the following valves for the applications if not indicated on drawings:
1. Throttling (Hydronic): Butterfly, Ball, Globe, and Angle.
2. Isolation (Shutoff): Butterfly and Ball.
3. Swing Check (Pump Outlet):
    a. Size 2 inch and Smaller: Bronze with bronze disc.
    b. 2-1/2 NPS and Larger: Iron with lever and spring or center-guided metal.

C. Substitutions of valves with higher CWP classes or WSP ratings for same valve types are permitted when specified CWP ratings or WSP classes are not available.
D. Heating and Chilled Water Valves:
1. 2 NPS and Smaller, Bronze Valves:
    a. Threaded ends.
    b. Angle: Bronze disc, Class 125.
    c. Ball: Full port, two piece, stainless steel trim.
    d. Swing Check: Bronze disc, Class.
    e. Gate: NRS, Class 125.
    f. Globe: Bronze disc, Class 125.
2. Size 2-1/2 inch and Larger, Iron Valves:
    a. 2-1/2 NPS to 4 NPS: Flanged ends.
    b. Ball: 2-1/2 NPS to 10 inch, Class 150.
    c. Grooved-End Butterfly: 2-1/2 inch to 12 inch, 175 CWP.
    d. Swing Check: Metal seats, Class 125.
    e. Gate: NRS, Class 125.
    f. Globe: Class 125.

2.02 GENERAL REQUIREMENTS

A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.
B. Valve Sizes: Match upstream piping unless otherwise indicated.
C. Valve Actuator Types:
1. Handwheel: Valves other than quarter-turn types.

2. Hand Lever: Quarter-turn valves 6 NPS and smaller.

D. Valves in Insulated Piping: Provide 2 inch stem extensions and the following features:
1. Gate Valves: Rising stem.
2. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
3. Butterfly Valves: Extended neck.
4. Memory Stops: Fully adjustable after insulation is installed.

E. Valve-End Connections:
1. Threaded End Valves: ASME B1.20.1.
2. Flanges on Iron Valves: ASME B16.1 for flanges on iron valves.
3. Pipe Flanges and Flanged Fittings 1/2 inch through 24 inch: ASME B16.5.
4. Solder Joint Connections: ASME B16.18.
5. Grooved End Connections: AWWA C606.

F. General ASME Compliance:
1. Ferrous Valve Dimensions and Design Criteria: ASME B16.10 and ASME B16.34.
2. Building Services Piping Valves: ASME B31.9.

G. Bronze Valves:
1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

H. Valve Bypass and Drain Connections: MSS SP-45.

I. Source Limitations: Obtain each valve type from a single manufacturer.

2.03 **MANUFACTURERS**

A. Nibco, Inc.: www.nibco.com
B. Milwaukee Valve Company: www.milwaukeevalve.com
C. Apollo Valve: www.apollovalve.com
D. Jomar Valve: www.jomar.com

2.04 BRONZE, ANGLE VALVES

A. Class 125: CWP Rating: 200 psig:.
1. Comply with MSS SP-80, Type 1.
2. Body: Bronze; ASTM B62, with integral seat and screw in bonnet.
3. Ends: Threaded.
4. Stem: Bronze.
5. Disc: Bronze or PTFE.
6. Packing: Asbestos free.
7. Handwheel: Bronze or aluminum.

2.05 BRONZE, GLOBE VALVES

A. CWP Rating: Class 125: 200 psi:
1. Comply with MSS SP-80, Type 1.
2. Body: Bronze; ASTM B62, with integral seat and screw in bonnet.
3. Ends: Threaded or solder joint.
4. Stem and Disc: Bronze or PTFE.

5. Packing: Asbestos free.
    a. Handwheel: Malleable iron.

2.06 IRON, GLOBE VALVES

A. CWP Ratings: Class 125: 200 psi and Class 250: 500 psi:
    1. Comply with MSS SP-85, Type I.
    2. Body: Gray iron; ASTM A126, with bolted bonnet.
    3. Ends: Flanged.
    4. Trim: Bronze.
    5. Packing and Gasket: Asbestos free.
    6. Operator: Handwheel or chainwheel.

2.07 BRONZE, BALL VALVES

A. General:
    1. Fabricate from dezincification resistant material.
    2. Copper alloys containing more than 15 percent zinc are not permitted.
B. Two Piece, Full Port with Bronze or Brass Trim:
    1. Comply with MSS SP-110.
    2. WSP Rating: 150 psi.
    3. WOG Rating: 400 psi.
    4. Body: Forged bronze or dezincified-brass alloy.
    5. End Connections: Pipe thread or solder.
    6. Seats: PTFE.
    7. Stem: Bronze or brass.
    8. Ball: Chrome plated brass.

2.08 IRON, SINGLE FLANGE BUTTERFLY VALVES

A. Lug Style; Bidirectional dead-end service without use of downstream flange:
    1. Comply with MSS SP-67, Type I.
    2. Lug Style, CWP Ratings:
        a. Sizes 2 to 12 inch: 150 psi.
        b. Sizes 14 to 24 inch: 100 psi.
        c. Vacuum Service: Down to 29.9 in-Hg.
    3. Body Material: ASTM A126 cast iron or ASTM A536 ductile iron.
    4. Stem: One or two-piece stainless steel.
    5. Seat: NBR.
    6. Disc: Coated ductile iron.

2.09 IRON, GROOVED-END BUTTERFLY VALVES

2.10 BRONZE, LIFT CHECK VALVES

A. Class 125:
    1. Comply with MSS SP-80, Type 1, Metal Disc to Metal Seat and Type 2, Nonmetallic Disc to Metal Seat.
    2. CWP Rating: 200 psi.

3. Design: Vertical flow.
4. Body: Bronze.
5. Ends: Threaded.
6. Disc (Type 1): Bronze.
7. Disc (Type 2): NBR or PTFE.

2.11 BRONZE, SWING CHECK VALVES

2.12 IRON, FLANGED END SWING CHECK VALVES

2.13 IRON, GROOVED-END SWING CHECK VALVES

A. Class 300:
1. CWP Rating: 300 psi.
2. Body Material: ASTM A536, Grade 65-45-12 ductile iron.
3. Seal: EPDM or Nitrile.
4. Disc: Ductile iron.
5. Coating: Black, non-lead paint.

2.14 BRONZE, GATE VALVES

A. Non-Rising Stem (NRS) or Rising Stem (RS):
1. Class 125: CWP Rating; 200 psi.
2. Body Material: Bronze with integral seat and union-ring bonnet.
3. Ends: Threaded or solder joint.
4. Stem: Bronze.
5. Disc: Solid wedge; bronze.
6. Packing: Asbestos free.
7. Handwheel: Malleable iron, bronze, or aluminum.

2.15 IRON, GATE VALVES

A. OS & Y:
1. Comply with MSS SP-70, Type I.
2. Body Material: Gray iron with bolted bonnet.
3. Ends: Flanged.
4. Trim: Bronze.
5. Disc: Solid wedge.
6. Packing and Gasket: Asbestos free.

PART 3 EXECUTION

3.01 EXAMINATION

A. Discard all packing materials and verify that valve interior, including threads and flanges, are completely clean without signs of damage or degradation that could result in leakage.
B. Verify valve parts to be fully operational in all positions from closed to fully open.
C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.

D. Should valve is determined to be defective, replace with new valve.

3.02 INSTALLATION

A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.
B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.
C. Where valve support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welds.
D. Install check valves where necessary to maintain direction of flow as follows:
   1. Swing Check: Install horizontal maintaining hinge pin level.

END OF SECTION

SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment components.

1.02 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
C. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General-Purpose Piping; 2022.
D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999, with Editorial Revision (2022).
F. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2013.
G. ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures; 1999 (Reapproved 2022).
H. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.
I. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2022.
J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
K. FM (AG) - FM Approval Guide; Current Edition.
L. MFMA-4 - Metal Framing Standards Publication; 2004.
M. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).
N. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
O. UL (DIR) - Online Certifications Directory; Current Edition.
P. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
   2. Coordinate the work with other trades to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.

4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
5. Notify Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.
B. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.
   1. Application of protective inserts, saddles, and shields at pipe hangers for each type of insulation and hanger.
C. Evaluation Reports: For products specified as requiring evaluation and recognition by ICC Evaluation Service, LLC (ICC-ES), provide current ICC-ES evaluation reports upon request.
D. Installer's Qualifications: Include evidence of compliance with specified requirements.
E. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.05 QUALITY ASSURANCE

A. Comply with applicable building code.
B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
   2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
   3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
   4. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
      a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
      b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.

c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Prefabricated Trapeze-Framed Metal Strut Systems:
1. Manufacturers:
a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com/#sle.
b. Unistrut, a brand of Atkore International Inc: www.unistrut.com/#sle.
c. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
2. Strut Channel or Bracket Material:
a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
3. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch.
4. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height.
5. Accessories: Provide bracket covers, cable basket clips, cable tray clips, clamps, conduit clamps, fire-retarding brackets, j-hooks, protectors, and vibration dampeners.

C. Hanger Rods:
1. Threaded zinc-plated steel unless otherwise indicated.

D. Thermal Insulated Pipe Supports:
1. General Requirements:
a. Insulated pipe supports to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
b. Surface Burning Characteristics: Flame spread index/smoke developed index of 5/30, maximum, when tested in accordance with ASTM E84 or UL 723.
c. Pipe supports to be provided for nominally sized, 1/2 to 30 inch iron pipes.
d. Insulation inserts to consist of rigid polyisocyanurate (urethane) insulation surrounded by a 360 degree, PVC jacketing.
2. PVC Jacket:
a. Pipe insulation protection shields to be provided.
b. Moisture Vapor Transmission: 0.0071 perm inch, when tested in accordance with ASTM E96/E96M.
c. Thickness: 60 mil.

E. Pipe Supports:
1. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.
2. Operating Temperatures from 40 degrees F to 250 degrees F:
a. Overhead Support: MSS SP-58 Type 1 or 3 through 12, with appropriate saddle of MSS SP-58 Type 40 for insulated pipe.
b. Roller Support: MSS SP-58 Types 41 or 43 through 46, with appropriate saddle of MSS SP-58 Type 39 for insulated pipe.
c. Sliding Support: MSS SP-58 Types 35 through 38.

F. Beam Clamps:
1. MSS SP-58 types 19 through 23, 25 or 27 through 30 based on required load.
2. Beam C-Clamp: MSS SP-58 type 23, malleable iron and steel with zinc finish.

3. Small or Junior Beam Clamp: MSS SP-58 type 19, malleable iron with zinc finish. For inverted usage provide manufacturer listed size(s).
4. Wide Mouth Beam Clamp: MSS SP-58 type 19, malleable iron with plain finish.
5. Centerload Beam Clamp with Extension Piece: MSS SP-58 type 30, malleable iron with plain finish.
6. FM (AG) and UL (DIR) Approved Beam Clamp: MSS SP-58 type 19, plain finish,
7. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.
8. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.

G. Riser Clamps:
1. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.
2. MSS SP-58 type 1 or 8, carbon steel or steel with plain or zinc plated finish.
3. Medium Split Horizontal Pipe Clamp: MSS SP-58 type 4, carbon steel with plain or zinc plated finish.
4. Copper Tube Pipe Clamp: MSS SP-58 type 8, epoxy plated copper.
5. UL (DIR) listed: Pipe sizes 1/2 to 8 inch.

H. Strut Clamps:
1. Pipe Clamp: Two-piece rigid, universal, or outer diameter type, carbon steel with epoxy copper or zinc finish.
2. Cushioned Pipe or Tubing Strut Clamp: Provide strut clamp with thermoplastic elastomer cushion having dielectric strength of 670 V/mil.

I. Insulation Clamps:
1. Two bolt-type clamps designed for installation under insulation.
2. Material: Carbon steel with epoxy copper or zinc finish.

J. Pipe Hangers:
1. Split Ring Hangers:
   a. Provide hinged split ring hanger with epoxy copper or plain finish.
   b. Material: ASTM A47/A47M malleable iron or ASTM A36/A36M carbon steel.
   c. Provide hanger rod and nuts of the same type and material for a given pipe run.
   d. Provide coated or plated hangers to isolate steel hangers from dissimilar metal tube or pipe.
2. Clevis Hangers, Adjustable:
   a. Copper Tube: MSS SP-58 Type 1, epoxy-plated copper.
   b. Standard-Duty: MSS SP-58 Type 1, zinc-colored, epoxy plated.
   c. UL (DIR) listed: Pipe sizes 2-1/2 to 8 inch.

K. Pipe Shields for Insulated Piping:
1. General Construction and Requirements:
   a. Surface Burning Characteristics: Comply with ASTM E84 or UL 723.
   b. Shields Material: UV-resistant polypropylene with glass fill.
   c. Maximum Insulated Pipe Outer Diameter: 12-5/8 inch.
   d. Minimum Service Temperature: Minus 40 degrees F.
   e. Maximum Service Temperature: 178 degrees F.

f. Pipe shields to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.

L. Anchors and Fasteners:
1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
4. Hollow Masonry: Use toggle bolts.
5. Hollow Stud Walls: Use toggle bolts.
6. Steel: Use beam-ceiling clamps, beam clamps, machine bolts, or welded threaded studs.
7. Beam Ceiling Flanges: ASTM A47/A47M Grade 32510, malleable iron or stainless steel with copper, plain, stainless steel, or zinc finish.
8. Sheet Metal: Use sheet metal screws.
9. Wood: Use wood screws.
10. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
a. Comply with MFMA-4.
b. Channel Material: Use galvanized steel.
c. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch minimum base metal thickness.
d. Manufacturer: Same as manufacturer of metal channel (strut) framing system.
11. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.
B. Verify that mounting surfaces are ready to receive support and attachment components.
C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.
B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
C. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.
D. Unless specifically indicated or approved by Engineer, do not provide support from suspended ceiling support system or ceiling grid.
E. Unless specifically indicated or approved by Engineer, do not provide support from roof deck.
F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
G. Equipment Support and Attachment:
1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.

2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

H. Preset Concrete Inserts: Use manufacturer-provided closure strips to inhibit concrete seepage during concrete pour.

I. Secure fasteners according to manufacturer's recommended torque settings.

J. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

A. Inspect support and attachment components for damage and defects.

B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

C. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

SECTION 230548 - VIBRATION ISOLATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Vibration isolation requirements.
B. Vibration isolators.

1.02 REFERENCE STANDARDS

A. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications; Most Recent Edition Cited by Referring Code or Reference Standard.
B. MFMA-4 - Metal Framing Standards Publication; 2004.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate selection and arrangement of vibration isolation and/or seismic control components with the actual equipment to be installed.
   2. Coordinate the work with other trades to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Notify Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
B. Sequencing:
   1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 033000.

1.04 SUBMITTALS

A. Design Documents: Prepare and submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, details, and calculations.
B. Shop Drawings - Vibration Isolation Systems:
   1. Include dimensioned plan views and sections indicating proposed arrangement of vibration isolators; indicate equipment weights and static deflections.
   2. Vibration-Isolated Equipment Support Bases: Include base weights, including concrete fill where applicable; indicate equipment mounting provisions.
C. Evaluation Reports: For products specified as requiring evaluation and recognition by a qualified evaluation service, provide current evaluation reports.
D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
E. Evidence of qualifications for manufacturer.
F. Manufacturer’s detailed field testing and inspection procedures.
G. Field quality control test reports.

1.05 QUALITY ASSURANCE

A. Comply with applicable building code.
B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 VIBRATION ISOLATION REQUIREMENTS

A. Design and provide vibration isolation systems to reduce vibration transmission to supporting structure from vibration-producing HVAC equipment and/or HVAC connections to vibration-isolated equipment.
B. Comply with applicable general recommendations of ASHRAE (HVACA), where not in conflict with other specified requirements:
C. General Requirements:
    1. Select vibration isolators to provide required static deflection.
    2. Select vibration isolators for uniform deflection based on distributed operating weight of actual installed equipment.
    3. Select vibration isolators for outdoor equipment to comply with wind design requirements.
    4. Select vibration-isolated equipment support bases and associated vibration isolators to provide minimum 2-inch operating clearance beneath base unless otherwise indicated.
D. Piping Isolation:
    1. Provide vibration isolators for piping supports:
        a. Located in equipment rooms.
        b. Located within 50 feet of connected vibration-isolated equipment and pressure-regulating valve (PRV) stations.
        c. For piping over 2 inch located below or within 50 feet of noise-sensitive areas indicated.
    2. Minimum Static Deflection:
        a. First Three Supports Closest to Isolated Equipment: Same as static deflection of equipment; maximum of 2 inch deflection required.
        b. Remainder of Supports: 0.75 inch deflection unless otherwise indicated.
    3. Suspended Piping, Nonseismic Applications: Use resilient material isolator hangers, spring isolator hangers, or combination resilient material/spring isolator hangers.
    4. Floor-Mounted Piping, Nonseismic Applications: Use open (unhoused) spring isolators.
    5. Use modular seal or approved resilient material where vibration-isolated piping penetrates building elements (e.g., walls, floors) arranged to prevent vibration transmission to structure.

2.02 VIBRATION ISOLATORS

A. Manufacturers:
    1. Vibration Isolators:
        a. Kinetics Noise Control, Inc: www.kineticsnoise.com/#sle.

b. Mason Industries: www.mason-ind.com/#sle.
c. Vibration Eliminator Company, Inc: www.veco-nyc.com/#sle.

B. General Requirements:
1. Resilient Materials for Vibration Isolators: Oil, ozone, and oxidant resistant.
2. Spring Elements for Spring Isolators:
a. Color code or otherwise identify springs to indicate load capacity.
b. Lateral Stability: Minimum lateral stiffness to vertical stiffness ratio of 0.8.
c. Designed to operate in the linear portion of their load versus deflection curve over deflection range of not less than 50 percent above specified deflection.
d. Designed to provide additional travel to solid of not less than 50 percent of rated deflection at rated load.
e. Selected to provide designed deflection of not less than 75 percent of specified deflection.
f. Selected to function without undue stress or overloading.

C. Vibration Isolators for Nonseismic Applications:
1. Resilient Material Isolator Pads:
a. Description: Single or multiple layer pads utilizing elastomeric (e.g. neoprene, rubber) isolator material.
b. Pad Thickness: As required for specified minimum static deflection; minimum 0.25 inch thickness.
c. Multiple Layer Pads: Provide bonded, galvanized sheet metal separation plate between each layer.
2. Resilient Material Isolator Mounts, Nonseismic:
a. Description: Mounting assemblies for bolting equipment to supporting structure utilizing elastomeric (e.g., neoprene, rubber) or fiberglass isolator material; fail-safe type.
3. Open (Unhoused) Spring Isolators:
a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) without a housing.
b. Bottom Load Plate: Nonskid, molded, elastomeric isolator material or steel with nonskid elastomeric isolator pad with provisions for bolting to supporting structure as required.
c. Furnished with integral leveling device for positioning and securing supported equipment.
4. Housed Spring Isolators:
a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) within a metal housing.
b. Furnished with integral elastomeric snubbing elements, nonadjustable type, for limiting equipment movement and preventing metal-to-metal contact between housing elements.
c. Bottom Load Plate: Steel with nonskid, elastomeric isolator pad with provisions for bolting to supporting structure as required.
d. Furnished with integral leveling device for positioning and securing supported equipment.
5. Restrained Spring Isolators, Nonseismic:

a. Description: Isolator assembly consisting of single or multiple free-standing, laterally stable steel spring(s) within a metal housing designed to prevent movement of supported equipment above an adjustable vertical limit stop.
b. Bottom Load Plate: Steel with nonskid elastomeric isolator pad with provisions for bolting to supporting structure as required.
c. Furnished with integral leveling device for positioning and securing supported equipment.
d. Provides constant free and operating height.

6. Resilient Material Isolator Hangers, Nonseismic:
   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing elastomeric (e.g., neoprene, rubber) or fiberglass isolator material for the lower hanger rod connection.
7. Spring Isolator Hangers, Nonseismic:
   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) in series with an elastomeric element for the lower hanger rod connection.
   b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short-circuiting of isolation.
8. Combination Resilient Material/Spring Isolator Hangers, Nonseismic:
   a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) for the lower hanger rod connection and elastomeric (e.g., neoprene, rubber) or fiberglass isolator material for the upper hanger rod connection.
   b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short-circuiting of isolation.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.
B. Verify that mounting surfaces are ready to receive vibration isolation and/or seismic control components and associated attachments.
C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.
B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
C. Secure fasteners according to manufacturer's recommended torque settings.
D. Install flexible piping connections to provide sufficient slack for vibration isolation and/or seismic relative displacements as indicated or as required.
E. Vibration Isolation Systems:
   1. Vibration-Isolated Equipment Support Bases:
      a. Provide specified minimum clearance beneath base.
   2. Spring Isolators:
      a. Position equipment at operating height; provide temporary blocking as required.

b. Lift equipment free of isolators prior to lateral repositioning to avoid damage to isolators.
c. Level equipment by adjusting isolators gradually in sequence to raise equipment uniformly such that excessive weight or stress is not placed on any single isolator.

3. Isolator Hangers:
   a. Use precompressed isolator hangers where required to facilitate installation and prevent damage to equipment utility connection provisions.
   b. Locate isolator hangers at top of hanger rods in accordance with manufacturer's instructions.
4. Clean debris from beneath vibration-isolated equipment that could cause short-circuiting of isolation.
5. Use elastomeric grommets for attachments where required to prevent short-circuiting of isolation.
6. Adjust isolators to be free of isolation short circuits during normal operation.
7. Do not overtighten fasteners such that resilient material isolator pads are compressed beyond manufacturer's maximum recommended deflection.

3.03 FIELD QUALITY CONTROL

A. Inspect vibration isolation and/or seismic control components for damage and defects.
B. Vibration Isolation Systems:
   1. Verify isolator static deflections.
   2. Verify required clearance beneath vibration-isolated equipment support bases.
   3. Verify vibration isolation performance during normal operation; investigate sources of isolation short circuits.
C. Correct deficiencies and replace damaged or defective vibration isolation and/or seismic control components.

END OF SECTION

SECTION 230553 - HVAC IDENTIFICATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tags.
B. Stencils.
C. Pipe markers.

1.02 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2020.

1.03 SUBMITTALS

A. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
B. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
C. Product Data: Provide manufacturers catalog literature for each product required.
D. Manufacturer's Installation Instructions: Indicate special procedures, and installation.
E. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. Ductwork: Stencilled painting.
B. Piping: Pipe markers.
C. Valves: Tags.

2.02 TAGS

A. Manufacturers:
   1. Advanced Graphic Engraving: www.advancedgraphicengraving.com.
   2. Brady Corporation: www.bradycorp.com.
   3. Brimar Industries, Inc.: www.pipemarker.com.
   4. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com.
   5. Seton Identification Products, a Tricor Company: www.seton.com.
B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
D. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.03 STENCILS

A. Manufacturers:
   1. Brady Corporation: www.bradycorp.com.
   2. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com.

3. Seton Identification Products, a Tricor Company: www.seton.com.

B. Stencils: With clean cut symbols and letters of following size:
   1. Ductwork and Equipment: 2-1/2 inch high letters.

C. Spacing:
   1. Indicate type and direction on each branch.
   2. Paint type and direction 20' on center on all ducts.

2.04 PIPE MARKERS

A. Manufacturers:
   1. Brady Corporation: www.bradycorp.com.
   2. Brimar Industries, Inc.: www.pipemarker.com.
   3. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com.
   4. Seton Identification Products, a Tricor Company: www.seton.com.

B. Color: Comply with ASME A13.1.

C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure-sensitive adhesive backing and printed markings.

D. Spacing:
   1. Install at least one label (type and direction) on each branch.
   2. Install labels 20' on center on all piping.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install tags with corrosion resistant chain.

C. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

D. Install ductwork with stencilled painting. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Testing, adjustment and balancing of air systems.
B. Testing, adjustment, and balancing of hydronic systems.
C. Measurement of final operating condition of HVAC systems.
D. Sound measurement of equipment operating conditions.
E. Vibration measurement of equipment operating conditions.

1.02 REFERENCE STANDARDS

A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition; 2016.
B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2008, with Errata (2019).
C. NEBB (TAB) - Procedural Standards for Testing Adjusting and Balancing of Environmental Systems; 2015, with Errata (2017).
D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing; 2002.

1.03 SUBMITTALS

A. Installer Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.
B. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
    1. Submit to Engineer.
    2. Submit six weeks prior to starting the testing, adjusting, and balancing work.
    3. Include at least the following in the plan:
        a. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
        b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
        c. Identification and types of measurement instruments to be used and their most recent calibration date.
        d. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
        e. Final test report forms to be used.
        f. Detailed step-by-step procedures for TAB work for each system and issue, including:
            1) Terminal flow calibration (for each terminal type).
            2) Diffuser proportioning.
            3) Branch/submain proportioning.
            4) Total flow calculations.
            5) Rechecking.
            6) Diversity issues.
        g. Details of how TOTAL flow will be determined; for example:

1) Air: Sum of terminal flows via control system calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations.
2) Water: Pump curves, circuit setter, flow station, ultrasonic, etc.

h. Specific procedures that will ensure that both air and water side are operating at the lowest possible pressures and methods to verify this.
i. Confirmation of understanding of the outside air ventilation criteria under all conditions.
j. Method of verifying and setting minimum outside air flow rate will be verified and set and for what level (total building, zone, etc.).
k. Method of checking building static and exhaust fan and/or relief damper capacity.
l. Methods for making coil or other system plant capacity measurements, if specified.
m. Time schedule for deferred or seasonal TAB work, if specified.
n. Exhaust fan balancing and capacity verifications, including any required room pressure differentials.
o. Procedures for formal deficiency reports, including scope, frequency and distribution.

C. Control System Coordination Reports: Communicate in writing to the controls installer all setpoint and parameter changes made or problems and discrepancies identified during TAB that affect, or could affect, the control system setup and operation.

D. Progress Reports.

E. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.

1. Revise TAB plan to reflect actual procedures and submit as part of final report.
2. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for the Engineer and for inclusion in operating and maintenance manuals.
3. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
4. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
5. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
6. Units of Measure: Report data in both I-P (inch-pound) and SI (metric) units.
7. Include the following on the title page of each report:
   a. Name of Testing, Adjusting, and Balancing Agency.
   b. Address of Testing, Adjusting, and Balancing Agency.
   c. Telephone number of Testing, Adjusting, and Balancing Agency.
   d. Project name.
   e. Project location.
   f. Project Engineer.
   g. Project Contractor.
   h. Project altitude.
   i. Report date.

F. Project Record Documents: Record actual locations of flow measuring stations and balancing valves and rough setting.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. Perform total system balance in accordance with one of the following:
   1. AABC (NSTSB), AABC National Standards for Total System Balance.
   2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
   3. SMACNA (TAB).
B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
C. TAB Agency Qualifications:
   1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
   2. Having minimum of three years documented experience.
   3. Certified by one of the following:
      a. AABC, Associated Air Balance Council: www.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.
      b. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org/#sle.
D. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.
E. Pre-Qualified TAB Agencies:
   1. Independent Testing and Balancing, Wheaton, IL (630) 393-0966.
   2. Controlled Environmental Testing and Balancing (847) 490-8400.
   3. Southern Air Test and Balance (815) 433-9191
   4. Aaron Engineering Services (773) 287-1191
   5. Mechanical Test and Balance, Inc. (630) 742-4299
   6. Interactive Building Solutions (815) 724-0525
   7. Noble Air Test and Balance: (708) 598-5434
   8. Aero Building Solutions, Franklin Park, IL (847) 288-3200

3.02 EXAMINATION

A. Verify that systems are complete and operable before commencing work. Testing and balancing contractor is to coordiante all work with the Mechanical Contractor and the Temperature Controls Contractor at each site. The Testing and Balancing Contractor is to perform on site inspections at 25% completion, 75 % completion and Final completion and provide a written report at each stage identifying any problems noted that can affect the final system operation. The final report will include the following conditions:
   1. Systems are started and operating in a safe and normal condition.
   2. Temperature control systems are installed complete and operable.
   3. Proper thermal overload protection is in place for electrical equipment.
   4. Final filters are clean and in place. If required, install temporary media in addition to final filters.

5. Duct systems are clean of debris.
6. Fans are rotating correctly.
7. Fire and volume dampers are in place and open.
8. Air coil fins are cleaned and combed.
9. Access doors are closed and duct end caps are in place.
10. Air outlets are installed and connected.
11. Duct system leakage is minimized.
12. Hydronic systems are flushed, filled, and vented.
13. Pumps are rotating correctly.
14. Proper strainer baskets are clean and in place.
15. Service and balance valves are open.

B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.

C. The Temperature Controls Contractor will receive copies of the shop drawings for all of the equipment and temperature controls systems for review prior to begining their work.

D. Beginning of work means acceptance of existing conditions.

3.03 PREPARATION

A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to the Engineer to facilitate spot checks during testing.

B. Provide additional balancing devices as required.

3.04 ADJUSTMENT TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.

B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.05 RECORDING AND ADJUSTING

A. Ensure recorded data represents actual measured or observed conditions.

B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

C. Mark on drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.

D. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

E. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

F. A final acceptance meeting may be required at the Architect's discretion. The purpose of the meeting shall be to spot-check the final test and balance report and will consist of the following.
1. Up to 10% of all readings will be checked in the presense of the Architect. The locations of the readings will be determined by the Architect during the meeting.
2. If any of the readings differ from the final test and balance report by more than 5%, the entire report will be rejected.
3. All systems will then be balanced and the final report will be reissued.

4. Subsequent meetings may then be requried at the Architect's discretion. The final report will not be accepted until such time as the report can be verified in the Architect's presense.

G. Check and adjust systems approximately six months after final acceptance and submit report.

3.06 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.

B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.

C. Measure air quantities at air inlets and outlets.

D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

E. Use volume control devices to regulate air quantities only to the extent that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

F. Vary total system air quantities by adjustment of fan speeds. Provide sheave and belt changes required to produce the design airflow. Vary branch air quantities by damper regulation.

G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.

I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

K. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.

L. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries.

3.07 WATER SYSTEM PROCEDURE

A. Adjust water systems to provide required or design quantities.

B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gauges to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.

C. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.

D. Effect system balance with automatic control valves fully open to heat transfer elements.

E. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.

F. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

3.08 SCOPE

A. Test, adjust, and balance the following:
    1. Packaged Condensing Boilers
    2. Air Cooled Water Chillers.
    3. Air Inlets and Outlets.

3.09 MINIMUM DATA TO BE REPORTED

A. Electric Motors:
    1. Manufacturer.
    2. Model/Frame.
    3. HP/BHP.
    4. Phase, voltage, amperage; nameplate, actual, no load.
    5. RPM.
    6. Service factor.
    7. Starter size, rating, heater elements.
    8. Sheave Make/Size/Bore.
B. V-Belt Drives:
    1. Identification/location.
    2. Required driven RPM.
    3. Driven sheave, diameter and RPM.
    4. Belt, size and quantity.
    5. Motor sheave diameter and RPM.
    6. Center to center distance, maximum, minimum, and actual.
C. Chillers:
    1. Identification/number.
    2. Manufacturer.
    3. Capacity.
    4. Model number.
    5. Serial number.
    6. Evaporator entering water temperature, design and actual.
    7. Evaporator leaving water temperature, design and actual.
    8. Evaporator pressure drop, design and actual.
    9. Evaporator water flow rate, design and actual.
D. Duct Traverses:
    1. System zone/branch.
    2. Duct size.
    3. Area.
    4. Design velocity.
    5. Design air flow.
    6. Test velocity.
    7. Test air flow.
    8. Duct static pressure.
    9. Air temperature.

10. Air correction factor.

E. Air Distribution Tests:
   1. Air terminal number.
   2. Room number/location.
   3. Terminal type.
   4. Terminal size.
   5. Area factor.
   6. Design velocity.
   7. Design air flow.
   8. Test (final) velocity.
   9. Test (final) air flow.
   10. Percent of design air flow.

END OF SECTION

SECTION 230713 - DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Duct insulation.
B. Duct liner.
C. Jacketing and accessories.

1.02 RELATED REQUIREMENTS

A. Section 230553 - HVAC Identification.

1.03 REFERENCE STANDARDS

A. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
B. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.
C. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013 (Reapproved 2019).
D. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014 (Reapproved 2019).
E. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation; 2020.
F. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2019.
G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
H. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022a, with Editorial Revision (2023).
I. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
B. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.
B. Applicator Qualifications: Company specializing in performing the type of work specified in this section, with minimum 5 years of experience and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labelled with the Manufacturer's identification, including product density and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.07 FIELD CONDITIONS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, UL 723, ASTM E84, or UL 723.

2.02 GLASS FIBER WRAP, FLEXIBLE

A. Manufacturers:
   1. Johns Manville Insulations: www.jm.com
   2. Owens-Corning Fiberglas: www.owenscorning.com.
   3. Manson: www.imanson.com
B. Insulation: ASTM C553; flexible, noncombustible blanket.
   1. Installed 'R' value: 5 at 75 degrees F, when tested in accordance with ASTM C 518.
   2. Insulation density: 1.0 pounds per cubic foot minimum
   3. Maximum Water Vapor Absorption: 5.0 percent by weight.
C. Vapor Barrier Jacket:
   1. Kraft paper with glass fiber yarn and bonded to aluminized film.
   2. Secure with pressure-sensitive tape.
D. Vapor Barrier Tape:
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure-sensitive rubber-based adhesive.

2.03 GLASS FIBER, RIGID

A. Manufacturer:
   1. Johns Manville: www.jm.com.
   2. Manson: www.imanson.com
   3. Owens Corning Corporation: www.ocbuildingspec.com.
B. Insulation: ASTM C612; rigid, noncombustible blanket.
   1. K Value: 0.24 at 75 degrees F, when tested in accordance with ASTM C518.
C. Vapor Barrier Jacket:
   1. Kraft paper with glass fiber yarn and bonded to aluminized film.
   2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.

2.04 JACKETING AND ACCESSORIES

A. Aluminum Jacket:
   1. Comply with ASTM B209/B209M, Temper H14, minimum thickness of 0.016 inch with factory-applied polyethylene and kraft paper moisture barrier on the inside surface.

2. Thickness: 0.016 inch sheet.
3. Finish: Smooth.
4. Joining: Longitudinal slip joints and 2 inch laps.
5. Fittings: 0.016 inch thick die-shaped fitting covers with factory-attached protective liner.
6. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

2.05 DUCT LINER

A. Manufacturers:
   1. Johns Manville: www.jm.com.
   2. Manson: www.imanson.com
   3. Owens Corning Corporation: www.ocbuildingspec.com.
B. Insulation: Incombustible glass fiber complying with ASTM C 1071; flexible blanket, rigid board, and preformed round liner board; with poly vinyl acetate polymer or acrylic polymer shown to be fungus and bacteria resistant by testing to ASTM G 21 impregnated surface and edge coat.
   1. Installed 'R' value: 5 minimum at 75 degrees F.
   2. Service Temperature: Up to 250 degrees F.
   3. Minimum Noise Reduction Coefficients:
      a. 1/2 inch Thickness: 0.30.
      b. 1 inch Thickness: 0.45.
      c. 1-1/2 inches Thickness: 0.60.
      d. 2 inch Thickness: 0.70.
C. Adhesive: Waterproof, fire-retardant type, ASTM C916.
D. Liner Fasteners: Galvanized steel, self-adhesive pad with integral head.

PART 3 EXECUTION

3.01 EXAMINATION

A. Test ductwork for design pressure prior to applying insulation materials.
B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Install in accordance with NAIMA National Insulation Standards.
C. Insulate all ducts conveying air:
   1. Provide insulation with vapor barrier jackets.
   2. Finish with tape and vapor barrier jacket.
   3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
   4. Insulate entire system, including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
D. External Duct Insulation Application:
   1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
   2. Secure insulation without vapor barrier with staples, tape, or wires.

3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

E. Duct and Plenum Liner Application:
1. Adhere insulation with adhesive for 90 percent coverage.
2. Secure insulation with mechanical liner fasteners. Refer to SMACNA (DCS) for spacing.
3. Seal and smooth joints. Seal and coat transverse joints.
4. Seal liner surface penetrations with adhesive.
5. Duct dimensions indicated are net inside dimensions required for air-flow. Increase duct size to allow for insulation thickness.
6. Metal nosings or sleeves shall be installed over exposed duct liner edges that face opposite the direction of airflow.

3.03 SCHEDULES

A. Exhaust and Relief Ducts:
1. Rectangular ducts: 1" thick liner
2. Round ducts: 1" thick wrap

B. Supply Ducts:
1. Minimum installed R value of 6.
2. Concealed rectangular ducts: 2" thick wrap
3. Exposed rectangular ducts in finished spaces: 1.5" thick liner
4. Round ducts: 2" thick wrap

C. Return Ducts:
1. Concealed rectangular ducts: 1.5" thick wrap
2. Exposed rectangular ducts in finished spaces: 1" thick liner
3. Round ducts: 1.5" thick wrap

END OF SECTION

SECTION 230719 - HVAC PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flexible removable and reusable blanket insulation.
B. Jacketing and accessories.
C. Hydronic piping insulation.
D. Hydronic chilled water piping insulation.
E. Refrigerant piping insulation.

1.02 RELATED REQUIREMENTS

A. Section 232113 - Hydronic Piping: Placement of hangers and hanger inserts.
B. Section 232300 - Refrigerant Piping: Placement of inserts.

1.03 REFERENCE STANDARDS

A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019, with Editorial Revision (2023).
B. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2019).
C. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.
D. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation; 2017.
E. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2023.
F. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2022a.
G. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation; 2022.
H. ASTM D1056 - Standard Specification for Flexible Cellular Materials—Sponge or Expanded Rubber; 2020.
I. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics; 2019.
J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
K. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022a, with Editorial Revision (2023).
L. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
B. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.
B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum 5 years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.07 FIELD CONDITIONS

A. Maintain ambient conditions required by manufacturers of each product.
B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, UL 723, ASTM E84, or UL 723.

2.02 GLASS FIBER, RIGID

A. Manufacturers:
   1. CertainTeed Corporation: www.certainteed.com.
   2. Johns Manville Corporation: www.jm.com.
   3. Manson: www.imanson.com
   4. Owens Corning Corporation: www.ocbuildingspec.com.
B. Insulation: ASTM C547and ASTM C795; rigid molded, noncombustible.
   1. K Value: ASTM C177, 0.24 at 75 degrees F.
   2. Maximum Service Temperature: 850 degrees F.
   3. Maximum Moisture Absorption: 0.2 percent by volume.
C. Insulation: ASTM C547and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
   1. Maximum Service Temperature: 650 degrees F.
   2. Maximum Moisture Absorption: 0.2 percent by volume.
D. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.
E. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
F. Vapor Barrier Lap Adhesive: Compatible with insulation.
G. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.
   1. Manufacturers:

2.03 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

A. Manufacturers:
   1. Armacell LLC; ArmaFlex Ultra with FlameDefense: www.armacell.us/#sle.

B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
   1. Minimum Service Temperature: Minus 40 degrees F.
   2. Maximum Service Temperature: 180 degrees F.
   3. Connection: Waterproof vapor barrier adhesive.
C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

2.04 JACKETING AND ACCESSORIES

A. PVC Plastic.
   1. Manufacturers:
      a. Johns Manville Corporation: www.jm.com.
   2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
      a. Minimum Service Temperature: 0 degrees F.
      b. Maximum Service Temperature: 150 degrees F.
      c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
      d. Thickness: 10 mil, 0.010 inch.
      e. Connections: Brush on welding adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

A. Test piping for design pressure, liquid tightness, and continuity prior to applying insulation materials.
B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Install in accordance with NAIMA National Insulation Standards.
C. Exposed Piping: Locate insulation and cover seams in least visible locations.
D. All insulated piping; insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
E. All Glass fiber insulated piping:
   1. Provide vapor barrier jackets, factory-applied or field-applied; secure with self-sealing longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
   2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
F. Inserts and Shields:
   1. Application: All piping
   2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
   3. Insert location: Between support shield and piping and under the finish jacket.
   4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
   5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

G. Continue insulation through walls, sleeves, pipe hangers, supports and other pipe penetrations. Finish at protrusions, and interruptions. At fire separations, refer to Section 078400.

H. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping. Provide two coats of UV resistant finish for flexible elastomeric cellular insulation without jacketing.

3.03 SCHEDULE

A. All Hydronic, System Fill and Expansion Piping:
   1. Water Supply and Return:
      a. Glass Fiber Insulation:
         1) 3/4" to 1.5" piping: 1.5" thick
         2) 2" and larger piping: 2" thick

B. Cooling Systems:
   1. Condensate Drains from Cooling Coils:
      a. 1/2" thick flexible elastomeric insulation. Join and seal with 620 adhesive.
   2. Refrigerant Suction:
      a. 1" thick flexible elastomeric insulation. Join and seal with 620 adhesive.Provide aluminum jacket

END OF SECTION

SECTION 230800 - COMMISSIONING OF HVAC

PART 1 GENERAL

1.01 SUMMARY

A. See Section 019113 - General Commissioning Requirements for overall objectives; comply with the requirements of Section 019113.
B. This section covers the Contractor's responsibilities for commissioning; each subcontractor or installer responsible for the installation of a particular system or equipment item to be commissioned is responsible for the commissioning activities relating to that system or equipment item.
C. The Commissioning Authority (CA) directs and coordinates all commissioning activities and provides Prefunctional Checklists and Functional Test Procedures for Contractor's use.
D. The entire HVAC system is to be commissioned, including commissioning activities for the following specific items:
    1. Control system.
    2. Major and minor equipment items.
    3. Piping systems and equipment.
    4. Other equipment and systems explicitly identified elsewhere in Contract Documents as requiring commissioning.
E. All documents and the management of the construction process will be done through the use of Procore.
F. The Prefunctional Checklist and Functional Test requirements specified in this section are in addition to, not a substitute for, inspection or testing specified in other sections.

1.02 RELATED REQUIREMENTS

A. Section 019113 - General Commissioning Requirements: Commissioning requirements that apply to all types of work.

1.03 REFERENCE STANDARDS

A. ASHRAE Guideline 1.1 - HVAC&R Technical Requirements for the Commissioning Process; 2007, with Errata (2012).

1.04 SUBMITTALS

A. Updated Submittals: Keep the Commissioning Authority informed of all changes to control system documentation made during programming and setup; revise and resubmit when substantial changes are made.
B. Draft Prefunctional Checklists and Functional Test Procedures for Control System: Detailed written plan indicating the procedures to be followed to test, checkout and adjust the control system prior to full system Functional Testing; include at least the following for each type of equipment controlled:
    1. System name.
    2. List of devices.
    3. Step-by-step procedures for testing each controller after installation, including:
        a. Process of verifying proper hardware and wiring installation.
        b. Process of downloading programs to local controllers and verifying that they are addressed correctly.

c. Process of performing operational checks of each controlled component.
d. Plan and process for calibrating valve and damper actuators and all sensors.
e. Description of the expected field adjustments for transmitters, controllers and control actuators should control responses fall outside of expected values.

4. Copy of proposed log and field checkout sheets to be used to document the process; include space for initial and final read values during calibration of each point and space to specifically indicate when a sensor or controller has "passed" and is operating within the contract parameters.
5. Description of the instrumentation required for testing.
6. Indicate what tests on what systems should be completed prior to TAB using the control system for TAB work. Coordinate with the Commissioning Authority and TAB contractor for this determination.

C. Startup Reports, Prefunctional Checklists, and Trend Logs: Submit for approval of Commissioning Authority.

D. HVAC Control System O&M Manual Requirements. In addition to documentation specified elsewhere, compile and organize at minimum the following data on the control system:

1. Specific step-by-step instructions on how to perform and apply all functions, features, modes, etc. mentioned in the controls training sections of this specification and other features of this system. Provide an index and clear table of contents. Include the detailed technical manual for programming and customizing control loops and algorithms.
2. Full as-built set of control drawings.
3. Full as-built sequence of operations for each piece of equipment.
4. Full points list; in addition to the information on the original points list submittal, include a listing of all rooms with the following information for each room:
   a. Floor.
   b. Room number.
   c. Room name.
   d. Air handler unit ID.
   e. Reference drawing number.
   f. Air terminal unit tag ID.
   g. Heating and/or cooling valve tag ID.
   h. Minimum air flow rate.
   i. Maximum air flow rate.
5. Full print out of all schedules and set points after testing and acceptance of the system.
6. Full as-built print out of software program.
7. Electronic copy on disk of the entire program for this facility.
8. Marking of all system sensors and thermostats on the as-built floor plan and HVAC drawings with their control system designations.
9. Maintenance instructions, including sensor calibration requirements and methods by sensor type, etc.
10. Control equipment component submittals, parts lists, etc.
11. Warranty requirements.
12. Copies of all checkout tests and calibrations performed by the Contractor (not commissioning tests).
13. Organize and subdivide the manual with permanently labeled tabs for each of the following data in the given order:

a. Sequences of operation.
b. Control drawings.
c. Points lists.
d. Controller and/or module data.
e. Thermostats and timers.
f. Sensors and DP switches.
g. Valves and valve actuators.
h. Dampers and damper actuators.
i. Program setups (software program printouts).

E. Project Record Documents: See Section 017800 for additional requirements.
1. Submit updated version of control system documentation, for inclusion with operation and maintenance data.
2. Show actual locations of all static and differential pressure sensors (air, water and building pressure) and air-flow stations on project record drawings.

F. Draft Training Plan: In addition to requirements specified in Section 017900, include:
1. Follow the recommendations of ASHRAE Guideline 1.1.
2. Control system manufacturer's recommended training.
3. Demonstration and instruction on function and overrides of any local packaged controls not controlled by the HVAC control system.

G. Training Manuals: See Section 017900 for additional requirements.
1. Provide three extra copies of the controls training manuals in a separate manual from the O&M manuals.

PART 2 PRODUCTS

2.01 TEST EQUIPMENT

A. Provide all standard testing equipment required to perform startup and initial checkout and required functional performance testing; unless otherwise noted such testing equipment will NOT become the property of Owner.

B. Equipment-Specific Tools: Where special testing equipment, tools and instruments are specific to a piece of equipment, are only available from the vendor, and are required in order to accomplish startup or Functional Testing, provide such equipment, tools, and instruments as part of the work at no extra cost to Owner; such equipment, tools, and instruments are to become the property of Owner.

C. Proprietary test equipment and software required by any equipment manufacturer for programming and/or start-up, whether specified or not, shall be provided by the manufacturer of the equipment. The Manufacturer shall provide the test equipment, demonstrate its use, and assist in the commissioning process as needed. Proprietary test equipment (and software) shall become the property of the Using Agency upon completion of the commissioning process.

D. Data logging equipment and software required to test equipment will be provided by the CxA, but shall not become the property of the Using Agency.

E. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration within the past year to an accuracy of 0.5F and a resolution of + or - 0.1F. Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year.

PART 3 EXECUTION

3.01 GENERAL DOCUMENTATION REQUIREMENTS

A. With assistance from the installing contractors, the CxA will prepare Pre-Functional Checklists for all commissioned components, equipment, and systems
B. Red-lined Drawings:
    1. The contractor will verify all equipment, systems, instrumentation, wiring and components are shown correctly on red-lined drawings.
    2. Preliminary red-lined drawings must be made available to the Commissioning Team for use prior to the start of Functional Performance Testing.
    3. Changes, as a result of Functional Testing, must be incorporated into the final as-built drawings, which will be created from the red-lined drawings.
    4. The contracted party, as defined in the Contract Documents will create the as-built drawings.
C. Operation and Maintenance Data:
    1. Contractor will provide a copy of O&M literature within 45 days of each submittal acceptance for use during the commissioning process for all commissioned equipment and systems.
    2. The CxA will review the O&M literature once for conformance to project requirements.
    3. The CxA will receive a copy of the final approved O&M literature once corrections have been mad by the Contractor.
D. Demonstration and Training:
    1. Contractor will provide demonstration and training as required by the specifications.
    2. A complete training plan and schedule must be submitted by the contractor to the CxA four weeks (4) prior to any training.
    3. A training agenda for each training session must be submitted to the CxA one (1) week prior the training session.
    4. The CxA shall be notified at least 72 hours in advance of scheduled tests so that testing may be observed by the CxA and Using Agency's representative. A copy of the test record shall be provided to the CxA, Using Agency, and Architect.
    5. Engage a Factory-authorized service representative to train Using Agency's maintenance personnel to adjust, operate, and maintain specific equipment.
    6. Train Using Agency's maintenance personnel on procedures and schedules for starting and stopping, trouble shooting, servicing, and maintaining equipment.
    7. Review data in O&M Manuals.
E. Systems manual requirements:
    1. The Systems Manual is intended to be a usable information resource containing all of the information related to the systems, assemblies, and Commissioning Process in one place with indexes and cross references.
    2. The CM shall include final approved versions of the following information for the Systems Manual:
        a. As-Built System Schematics
        b. Verified Record Drawings
        c. Test Results (not otherwise included in Cx Record)
        d. Periodic Maintenance Information for computer maintenance management system

e. Recommendations for recalibration frequency of sensors and actuators
f. A list of contractors, subcontractors, suppliers, architects, and engineers involved in the project along with their contact information
g. Training Records, Information on training provided, attendees list, and any on-going training

3. This information shall be organized and arranged by building system, such as chilled water, heating hot water, etc.
4. Information should be provided in an electronic version to the extent possible. Legible, scanned images are acceptable for non-electronic documentation to facilitate this deliverable.

3.02 CONTRACTOR'S RESPONSIBILITIES

A. Division 23 Contractors. The commissioning responsibilities applicable to each of the contractors of Division 23 are as follows (all references apply to commissioned equipment only):
B. Perform commissioning tests at the direction of the CxA.
C. Attend construction phase controls coordination meetings.
D. Attend testing, adjusting, and balancing review and coordination meetings.
E. Participate in HVAC&R systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.
F. Provide information requested by the CxA for final commissioning documentation.
G. Include requirements for submittal data, operation and maintenance data, and training in each purchase order or sub-contract written.
H. Prepare preliminary schedule for HVAC&R system orientations and inspections, operation and maintenance manual submissions, training sessions, pipe and duct system testing, flushing and cleaning, equipment start-up, testing and balancing and task completion for Using Agency. Distribute preliminary schedule to commissioning team members.
I. Update schedule as required throughout the construction period.
J. During the startup and initial checkout process, execute the related portions of the prefunctional checklists for all commissioned equipment.
K. Assist the CxA in all verification and functional performance tests.
L. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.
M. Gather operation and maintenance literature on all equipment, and assemble in binders as required by the specifications. Submit to CxA (45) days after submittal acceptance.
N. Coordinate with the CxA to provide (48) hour advance notice so that the witnessing of equipment and system start-up and testing can begin.
O. Notify the CxA a minimum of (2) weeks in advance of the time for start of the testing and balancing work. Attend the initial testing and balancing meeting for review of the official testing and balancing procedures.
P. Participate in, and schedule vendors and contractors to participate in the training sessions.
Q. Provide written notification to the CM/GC and CxA Authority that the following work has been completed in accordance with the contract documents, and that the equipment, systems, and sub-system are operating as required.
    1. HVAC&R equipment including all fans, air handling units, ductwork, dampers, terminals, and all other equipment furnished under this Division.

2. Fire stopping in the fire rated construction, including fire and smoke damper installation, caulking, gasketing and sealing of smoke barriers.
3. Fire detection and smoke detection devices furnished under other divisions of the specification.

R. The equipment supplier shall document the performance of his equipment.

S. Provide a complete set of red-lined drawings to the CxA prior to the start of Functional Performance Testing.

T. Heating and Ventilating Contractors
1. Attend initial commissioning coordination meeting scheduled by the Commissioning Authority.
2. Submit the site specific testing and balancing plan to the CxA and AE for review and acceptance.
3. Attend the testing and balancing review meeting scheduled by the CxA. Be prepared to discuss the procedures that shall be followed in testing, adjusting, and balancing the HVAC&R system.
4. At the completion of the testing and balancing work, and the submittal of the final testing and balancing report, notify the HVAC&R contractor and the CM/GC.
5. At the completion of testing and balancing work, and the submittal of the final testing and balancing report, notify the HVAC&R Contractor and the CM/GC.
6. Participate in verification of the testing and balancing report, which will consist of repeating measurements contained in the testing and balancing reports. Assist in diagnostic purposes when directed.

U. Provide training of the Using Agency's operating staff using expert qualified personnel, as specified.

V. Equipment Suppliers
1. Provide all requested submittal data, including detailed start-up procedures and specific responsibilities of the Using Agency, to keep warranties in force.
2. Assist in equipment testing per agreements with contractors.
3. Provide information requested by CxA regarding equipment sequence of operation and testing procedures.

W. Refer to Division 01 Section 019113 "General Commissioning Requirements" for additional contractor responsibilities.

3.03 **USING AGENCY'S RESPONSIBILITIES**

A. Refer to Division 01 Section 019113 "General Commissioning Requirements" for Using Agency's Responsibilities.

3.04 DESIGN PROFESSIONAL'S RESPONSIBILITIES

A. Refer to Division 01 Section 019113 "General Commissioning Requirements" for Design Professional's Responsibilities.

3.05 CXA'S RESPONSIBILITIES

A. Refer to Division 01 Section 019113 "General Commissioning Requirements" for CxA's Responsibilities.

3.06 PREPARATION

A. Cooperate with the Commissioning Authority in development of the Prefunctional Checklists and Functional Test Procedures.
B. Furnish additional information requested by the Commissioning Authority.
C. Prepare a preliminary schedule for HVAC pipe and duct system testing, flushing and cleaning, equipment start-up and testing, adjusting, and balancing start and completion for use by the Commissioning Authority; update the schedule as appropriate.
D. Notify the Commissioning Authority when pipe and duct system testing, flushing, cleaning, startup of each piece of equipment and testing, adjusting, and balancing will occur; when commissioning activities not yet performed or not yet scheduled will delay construction notify ahead of time and be proactive in seeing that the Commissioning Authority has the scheduling information needed to efficiently execute the commissioning process.
E. Put all HVAC equipment and systems into operation and continue operation during each working day of testing, adjusting, and balancing and commissioning, as required.
    1. Include cost of sheaves and belts that may be required for testing, adjusting, and balancing.
F. Provide test holes in ducts and plenums where directed to allow air measurements and air balancing; close with an approved plug.
G. Provide temperature and pressure taps in accordance with Contract Documents.
    1. Provide a pressure/temperature plug at each water sensor that is an input point to the control system.
H. Certify in writing to the CxA that HVAC&R systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.
I. Certify in writing to the CxA that HVAC&R instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.
J. Certify in writing that testing, adjusting, and balancing procedures have been completed and that testing, adjusting, and balancing reports have been submitted, discrepancies corrected, and corrective work approved.
K. Place systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).
L. Inspect and verify the position of each device and interlock identified on checklists.
M. Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.
N. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

3.07 INSPECTING AND TESTING - GENERAL

A. Submit startup plans, startup reports, and Prefunctional Checklists for each item of equipment or other assembly to be commissioned.
B. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.
C. Scope of HVAC&R testing shall include entire HVAC&R installation, from central equipment for heat generation and refrigeration through distribution systems to each conditioned space. Testing shall include measuring capacities and effectiveness of operational and control functions.

D. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.
E. The CxA along with the HVAC&R contractor, testing and balancing Subcontractor, and HVAC&R Instrumentation and Control Subcontractor shall prepare detailed testing plans, procedures, and checklists for HVAC&R systems, subsystems, and equipment.
F. Tests will be performed using design conditions whenever possible.
G. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by the CxA and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.
H. The CxA may direct that set points be altered when simulating conditions is not practical.
I. The CxA may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are not practical.
J. If tests cannot be completed because of a deficiency outside the scope of the HVAC&R system, document the deficiency and report it to the Using Agency. After deficiencies are resolved, reschedule tests.
K. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.
L. Perform the Functional Tests directed by the Commissioning Authority for each item of equipment or other assembly to be commissioned.
M. Provide two-way radios for use during the testing.
N. Valve/Damper Stroke Setup and Check:
    1. For all valve/damper actuator positions checked, verify the actual position against the control system readout.
    2. Set pump/fan to normal operating mode.
    3. Command valve/damper closed; visually verify that valve/damper is closed and adjust output zero signal as required.
    4. Command valve/damper open; verify position is full open and adjust output signal as required.
    5. Command valve/damper to a few intermediate positions.
    6. If actual valve/damper position does not reasonably correspond, replace actuator or add pilot positioner (for pneumatics).
O. Isolation Valve or System Valve Leak Check: For valves not by coils.
    1. With full pressure in the system, command valve closed.
    2. Use an ultra-sonic flow meter to detect flow or leakage.
P. Deficiencies: Correct deficiencies and re-inspect or re-test, as applicable, at no extra cost to Owner.

3.08 TAB COORDINATION

A. TAB: Testing, adjusting, and balancing of HVAC.
B. Coordinate commissioning schedule with TAB schedule.
C. Notify the CxA at least ten (10) days in advance of testing and balancing Work, and provide access for the CxA to witness testing and balancing Work.
D. Review the TAB plan to determine the capabilities of the control system toward completing TAB.

E. Provide all necessary unique instruments and instruct the TAB technicians in their use; such as handheld control system interface for setting terminal unit boxes, etc.

F. For equipment with pre-packaged controls, it is required for a certified manufacturers technician to work with the TAB technician on-site to properly balance the equipment and associated systems.

G. Have all required Prefunctional Checklists, calibrations, startup and component Functional Tests of the system completed and approved by the Commissioning Authority prior to starting TAB.

H. Provide a qualified control system technician to operate the controls to assist the TAB technicians or provide sufficient training for the TAB technicians to operate the system without assistance.

I. Provide technicians, instrumentation, and tools to verify testing and balancing of HVAC&R systems at the direction of the CxA.

1. The CxA will notify testing and balancing subcontractor ten (10) days in advance of the date of field verification. Notice will not include data points to be verified.
2. The testing and balancing subcontractor shall use the same instruments (by model and serial number) that were used when original data were collected.
3. Failure of an item includes, other than sound, a deviation of more than 10 percent. Failure of more than 10 percent of selected items shall result in rejection of final testing, adjusting, and balancing report. For sound pressure readings, a deviation of 3 dB shall result in rejection of final testing. Variations in background noise must be considered.
4. Remedy the deficiency and notify the CxA so verification of failed portions can be performed.

3.09 CONTROL SYSTEM FUNCTIONAL TESTING

A. Prefunctional Checklists for control system components will require a signed and dated certification that all system programming is complete as required to accomplish the requirements of Contract Documents and the detailed Sequences of Operation documentation submittal.

B. Do not start Functional Testing until all controlled components have themselves been successfully Functionally Tested in accordance with Contract Documents.

C. Using a skilled technician who is familiar with this building, execute the Functional Testing of the control system as required by the Commissioning Authority.

D. A certified technician provided by the manufacturer of the equipment being tested must be present during functional testing

E. Functional Testing of the control system constitutes demonstration and trend logging of control points monitored by the control system.

1. The scope of trend logging is partially specified; trend log up to 50 percent more points than specified at no extra cost to Owner.
2. Perform all trend logging specified in Prefunctional Checklists and Functional Test procedures.

F. Functionally Test integral or stand-alone controls in conjunction with the Functional Tests of the equipment they are attached to, including any interlocks with other equipment or systems; further testing during control system Functional Test is not required unless specifically indicated below.

G. Demonstrate the following to the Commissioning Authority during testing of controlled equipment; coordinate with commissioning of equipment.

1. Setpoint changing features and functions.

2. Sensor calibrations.

H. Demonstrate to the Commissioning Authority:
   1. That all specified functions and features are set up, debugged and fully operable.
   2. That scheduling features are fully functional and setup, including holidays.
   3. That all graphic screens and value readouts are completed.
   4. Correct date and time setting in central computer.
   5. That field panels read the same time as the central computer; sample 10 percent of field panels; if any of those fail, sample another 10 percent; if any of those fail test all remaining units at no extra cost to Owner.
   6. Functionality of field panels using local operator keypads and local ports (plug-ins) using portable computer/keypad; demonstrate 100 percent of panels and 10 percent of ports; if any ports fail, sample another 10 percent; if any of those fail, test all remaining units at no extra cost to Owner.
   7. Power failure and battery backup and power-up restart functions.
   8. Global commands features.
   9. Security and access codes.
   10. Occupant over-rides (manual, telephone, key, keypad, etc.).
   11. O&M schedules and alarms.
   12. Occupancy sensors and controls.
   13. Fire alarm interlocks and response.
   14. That points that are monitored only, having no control function, are reporting properly to the control system.
   15. All control strategies and sequences not tested during controlled equipment testing.
   16. Trend logging and graphing features that are specified.
   17. Other integrated tests specified in Contract Documents
   18. That control system features that are included but not specified to be setup are actually installed.

I. Perform and submit trend logging on the following using the control system, for minimum period of 5 days including one weekend, if the control points are monitored by the control system:
   1. Duty cycling, if specified.
   2. Demand limiting, including over-ride of limiting.
   3. Sequential staging ON of equipment; optionally demonstrate manually.
   4. Optimum start-stop functions.
   5. Miscellaneous equipment current or status for duty cycling and demand limiting.
   6. Equipment or building kW or current for demand limiting.
   7. Equipment optimum start/stop functions.

J. If the control system, integral control components, or related equipment do not respond to changing conditions and parameters appropriately as expected, as specified and according to acceptable operating practice, under any of the conditions, sequences, or modes tested, correct all systems, equipment, components, and software required at no additional cost to Owner.

3.10 HVAC&R SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES

A. Equipment Testing and Acceptance Procedures: Testing requirements are specified in individual Division 23 sections. Provide submittals, test data, inspector record, and certifications to the CxA.

B. HVAC&R Instrumentation and Control System Testing: Field testing plans and testing requirements are specified in Division 23 Sections "Instrumentation and Control for HVAC" and "Sequence of Operations for HVAC Controls." Assist the CxA with preparation of testing plans.

C. Pipe system cleaning, flushing, hydrostatic tests, and chemical treatment: Test requirements are specified in Division 23 piping Sections. HVAC&R Contractor shall prepare a pipe system cleaning, flushing, and hydrostatic testing plan. Provide cleaning, flushing, testing, and treating plan and final reports to the CxA. Plan shall include the following:
   1. Sequence of testing and testing procedures for each section of pipe to be tested, identified by pipe zone or sector identification marker. Markers shall be keyed to Drawings for each pipe sector, showing the physical location of each designated pipe test section. Drawings keyed to pipe zones or sectors shall be formatted to allow each section of piping to be physically located and identified when referred to in pipe system cleaning, flushing, hydrostatic testing, and chemical treatment plan.
      a. Description of equipment for flushing operations.
      b. Minimum flushing water velocity.
      c. Tracking checklist for managing and ensuring that all pipe sections have been cleaned, flushed, hydrostatically tested, and chemically treated.

D. Refrigeration System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of chillers, cooling towers, refrigerant compressors and condensers, heat pumps, and other refrigeration systems. The CxA shall determine the sequence of testing and testing procedures for each equipment item and pipe section to be tested.

E. HVAC&R Distribution System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of air, steam, and hydronic distribution systems; special exhaust; and other distribution systems, including HVAC&R terminal equipment and unitary equipment.

F. Vibration and Sound Tests: Provide technicians, instrumentation, tools, and equipment to test performance of vibration isolation and seismic controls.

G. The work included in the commissioning process involves a complete and thorough evaluation of the operation and performance of all components, systems and sub-systems. The following equipment and systems shall be evaluated:
   1. Automatic temperature controls integrated with the electrical systems
   2. Coordination and functionality with the Building Automation System/Building Management Controls
   3. Air Cooled Condensing Units
   4. Building Automation System
   5. Chemical Water Treatment
   6. Chilled Water System
   7. Ductwork
   8. Fire and Smoke Dampers
   9. Hot Water System
   10. Piping
   11. Pumps
   12. Testing, Adjusting and Balancing

3.11 OPERATION AND MAINTENANCE MANUALS

A. Add design intent documentation furnished by Engineer to manuals prior to submission to Owner.

B. Submit manuals related to items that were commissioned to Commissioning Authority for review; make changes recommended by Commissioning Authority.
C. Commissioning Authority will add commissioning records to manuals after submission to Owner.

3.12 DEMONSTRATION AND TRAINING

A. Demonstrate operation and maintenance of HVAC system to Owner' personnel; if during any demonstration, the system fails to perform in accordance with the information included in the O&M manual, stop demonstration, repair or adjust, and repeat demonstration. Demonstrations may be combined with training sessions if appropriate.
B. These demonstrations are in addition to, and not a substitute for, Prefunctional Checklists and demonstrations to the Commissioning Authority during Functional Testing.
C. Provide classroom and hands-on training of Owner's designated personnel on operation and maintenance of the HVAC system, control system, and all equipment items indicated to be commissioned. All training shall be recorded and a copy is to be provided to the commissioning and design team to be included in the final commissioning plan. Unless otherwise stated in the specifications the following is the minimum durations of training.
D. Provide classroom and hands-on training of Owner's designated personnel on operation and maintenance of the HVAC system, control system, and all equipment items indicated to be commissioned.
E. TAB Review: Instruct Owner's personnel for minimum 4 hours, after completion of TAB, on the following:
    1. Review final TAB report, explaining the layout and meanings of each data type.
    2. Discuss any outstanding deficient items in control, ducting or design that may affect the proper delivery of air or water.
    3. Identify and discuss any terminal units, duct runs, diffusers, coils, fans and pumps that are close to or are not meeting their design capacity.
    4. Discuss any temporary settings and steps to finalize them for any areas that are not finished.
    5. Other salient information that may be useful for facility operations, relative to TAB.
F. Provide the services of manufacturer representatives to assist instructors where necessary.
G. Provide the services of the HVAC controls instructor at other training sessions, when requested, to discuss the interaction of the controls system as it relates to the equipment being discussed.
H. Training shall include:
    1. Use of the printed installation, operation and maintenance instruction material included in the O&M manuals.
    2. A review of the written O&M instructions emphasizing safe and proper operating requirements, preventative maintenance, special tools needed and spare parts inventory suggestions. The training shall include start-up, operation in all modes possible, shut-down, seasonal changeover and any emergency procedures.
    3. Discussion of relevant health and safety issues and concerns.
    4. Discussion of warranties and guarantees.
    5. Common troubleshooting problems and solutions.
    6. Explanatory information included in the O&M manuals and the location of all plans and manuals in the facility.
    7. Discussion of any peculiarities of equipment installation or operation.

8. The format and training agenda in The HVAC Commissioning Process, ASHRAE Guideline 1-2007, is recommended.
9. Hands-on training shall include start-up, operation in all modes possible, including manual, shut-down and any emergency procedures and preventative maintenance for all pieces of equipment.
10. The mechanical contractor shall fully explain and demonstrate the operation, function and overrides of any local packaged controls, not controlled by the central control system.
11. Training shall occur after functional testing is complete, unless approved otherwise by the Using Agency.

I. Controls. The contractor shall have the following training responsibilities:
1. Provide the CxA and AE with a training plan four weeks before the planned training.
2. The controls contractor shall provide designated Using Agency personnel training on the control system in this facility. The intent is to clearly and completely instruct the Using Agency on all the capabilities of the control system.
3. Training manuals. The standard operating manual for the system and any special training manuals will be provided for each trainee, with three extra copies left for the O&M manuals. In addition, copies of the system technical manual will be demonstrated during training and three copies submitted with the O&M manuals. Manuals shall include detailed description of the subject matter for each session. The manuals will cover all control sequences and have a definitions section that fully describes all relevant words used in the manuals and in all software displays. Manuals will be approved by the CxA and AE. Copies of audiovisuals shall be delivered to the Using Agency.
4. The trainings will be tailored to the needs and skill-level of the trainees.
5. The trainers will be knowledgeable on the system and its use in buildings. For the on-site sessions, the most qualified trainer(s) will be used. The Using Agency shall approve the instructor prior to scheduling the training.
6. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system will be repaired or adjusted as necessary and the demonstration repeated.
7. The controls contractor shall attend sessions other than the controls training, as requested, to discuss the interaction of the controls system as it relates to the equipment being discussed.
8. There shall be three (3) training sessions:
    a. Training I. Control System. The first training shall consist of 8 hours of actual training. This training may be held on-site or in the supplier's facility. If held off-site, the training may occur prior to final completion of the system installation. Upon completion, each student, using appropriate documentation, should be able to perform elementary operations and describe general hardware architecture and functionality of the system.
    b. Training II. Building Systems. The second session shall be held on-site for a period of 8 hours of actual hands-on training after the completion of system commissioning. The session shall include instruction on:
        1) Specific hardware configuration of installed systems in this building and specific instruction for operating the installed system, including HVAC systems, lighting controls and any interface with security and communication systems.
        2) Security levels, alarms, system start-up, shut-down, power outage and restart routines, changing set points and alarms and other typical changed parameters,

overrides, freeze protection, manual operation of equipment, optional control strategies that can be considered, energy savings strategies and set points that if changed will adversely affect energy consumption, energy accounting, procedures for obtaining vendor assistance, etc.

3) All trending and monitoring features (values, change of state, totalization, etc.), including setting up, executing, downloading, viewing both tabular and graphically and printing trends. Trainees will actually set-up trends in the presence of the trainer.
4) Every screen shall be completely discussed, allowing time for questions.
5) Use of keypad or plug-in laptop computer at the zone level.
6) Use of remote access to the system via phone lines or networks.
7) Setting up and changing an air terminal unit controller.
8) Graphics generation
9) Point database entry and modifications
10) Understanding DDC field panel operating programming (when applicable)

c. Training III. The third training will be conducted on-site six months after occupancy and consist of 8 hours of training. The session will be structured to address specific topics that trainees need to discuss and to answer questions concerning operation of the system.

J. The Contractor shall have the following training responsibilities:
1. Shall meet for 4 hours with facility staff after completion of TAB and instruct them on the following:
a. Go over the final TAB report, explaining the layout and meanings of each data type.
b. Discuss any outstanding deficient items in control, ducting or design that may affect the proper delivery of air or water.
c. Identify and discuss any terminal units, duct runs, diffusers, coils, fans and pumps that are close to or are not meeting their design capacity.
d. Discuss any temporary settings and steps to finalize them for any areas that are not finished.
e. Other salient information that may be useful for facility operations, relative to TAB.

END OF SECTION

SECTION 230913 - INSTRUMENTATION AND CONTROL DEVICES FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Thermostats:
   1. Electric low limit duct thermostats.
B. Input/Ouput Sensors
   1. Equipment operation (current) sensors.
   2. Temperature sensors.
C. Control Panels.
D. Control Valves:
   1. Ball pattern
   2. Globe pattern
   3. Butterfly pattern
   4. Electronic operators

1.02 RELATED REQUIREMENTS

A. Section 230519 - Meters and Gauges for HVAC Piping: Thermometer sockets and gauge taps.
B. Section 230923 - Direct-Digital Control System for HVAC.
C. Section 230993 - Sequence of Operations for HVAC Controls.
D. Section 232113 - Hydronic Piping: Installation of control valves, flow switches, temperature sensor sockets, and gauge taps.
E. Section 232114 - Hydronic Specialties.
F. Section 233300 - Air Duct Accessories: Installation of automatic dampers.
G. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.
H. Section 262726 - Wiring Devices: Elevation of exposed components.

1.03 REFERENCE STANDARDS

A. AMCA 500-D - Laboratory Methods of Testing Dampers for Rating; 2018.
B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.
C. ASTM B32 - Standard Specification for Solder Metal; 2020.
D. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2022.
E. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
F. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2021.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.
B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

A. Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module.

B. Shop Drawings: Indicate complete operating data, system drawings, wiring diagrams, and written detailed operational description of sequences. Submit schedule of valves indicating size, flow, and pressure drop for each valve. For automatic dampers indicate arrangement, velocities, and static pressure drops for each system.

C. Manufacturer's Instructions: Provide for all manufactured components.

D. Operation and Maintenance Data: Include inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.

E. Project Record Documents: Record actual locations of control components, including panels, thermostats, and sensors. Accurately record actual location of control components, including panels, thermostats, and sensors.

1. Revise shop drawings to reflect actual installation and operating sequences.

F. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Designer Qualifications: Design system under direct supervision of a Professional Engineer experienced in design of this work and licensed in the State in which the Project is located.

B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years experience approved by manufacturer.

D. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.07 WARRANTY

A. Refer to section 230923 for specific requirements.

PART 2 PRODUCTS

2.01 EQUIPMENT - GENERAL

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

2.02 CONTROL PANELS

A. Unitized cabinet type for each system under automatic control with relays and controls mounted in cabinet and temperature indicators, pressure gauges, pilot lights, push buttons and switches flush on cabinet panel face.

B. NEMA EN 10250, general purpose utility enclosures with enameled finished face panel.

C. Provide common keying for all panels.

2.03 CONTROL VALVES

A. General:

1. All control valves and operators shall be rated by the Manufacturer to close against the full operating pressure of the system pump.

2. The Contractor shall be responsible for the control valves fitting within the space allowed for the installation of the valve.

3. All valves shall be installed such that the operators may be removed and replaced without removing any other equipment.
4. All water control valves shall be selected with a maximum pressure drop of 3.0 psi. This pressure drop must include all piping geometry effects (increasers, reducers).

B. Ball Pattern:
1. Forged brass body.
2. PTFE seats.
3. Chrome plated brass ball and stem assembly.

C. Globe Pattern:
1. Substitutions: See Section 016000 - Product Requirements.
2. Up to 2 inches: Bronze body, bronze trim, rising stem, renewable composition disc, screwed ends with backseating capacity repackable under pressure.
3. Over 2 inches: Iron body, bronze trim, rising stem, plug-type disc, flanged ends, renewable seat and disc.
4. Hydronic Systems:
   a. Rate for service pressure of 125 psig at 250 degrees F.
   b. Replaceable plugs and seats of stainless steel.
   c. Size for 3 psig maximum pressure drop at design flow rate.
   d. two-way valves shall have equal percentage characteristics, three way valves linear characteristics. Size two-way valve operators to close valves against pump shut off head.

D. Butterfly Pattern:
1. Iron body, bronze disc, resilient replaceable seat for service to 180 degrees F wafer or lug ends, extended neck.
2. Hydronic Systems:
   a. Rate for service pressure of 125 psig at 250 degrees F.
   b. Size for 1 psig maximum pressure drop at design flow rate.

E. Electronic Operators:
1. Select operator for full shut off at maximum pump differential pressure.

F. Radiation Valves:
1. Bronze body, bronze trim, 2 or 3 port as indicated, replaceable plugs and seats, union and threaded ends.
2. Rate for service pressure of 125 psig at 250 degrees F.
3. Size for 3 psig maximum pressure drop at design flow rate.
4. two-way valves shall have equal percentage characteristics, three way valves linear characteristics. Size two-way valve operators to close valves against pump shut off head.
5. Operators (Modulating): Self-contained, linear motorized actuator with approximately 3/4 inch stroke, 60 second full travel with transformer and SPDT contacts: 24 v DC, 6 watt maximum input.

2.04 DAMPERS

A. Performance: Test in accordance with AMCA 500-D.

B. Frames: Galvanized steel, welded or riveted with corner reinforcement, minimum 12 gauge, 0.1046 inch.

C. Blades: Galvanized steel, maximum blade size 8 inches wide, 48 inches long, minimum 22 gauge, 0.0299 inch, attached to minimum 1/2 inch shafts with set screws.

D. Blade Seals: Synthetic elastomeric, inflatable, mechanically attached, field replaceable.
E. Jamb Seals: Spring stainless steel.
F. Shaft Bearings: Oil impregnated sintered bronze.
G. Linkage Bearings: Oil impregnated sintered bronze.
H. Leakage: All dampers shall be Class I motorized dampers with an air leakage rate of not greater than 4 cfm/sf of damper surface area at 1.0" WC when tested in accordance with AMCA 500D.
I. Maximum Pressure Differential: 6 in-wc.
J. Temperature Limits: Minus 40 to 200 degrees F.

2.05 DAMPER OPERATORS

A. General: Provide smooth proportional control with sufficient power for air velocities 20 percent greater than maximum design velocity and to provide tight seal against maximum system pressures. Provide spring return for two position control and for fail safe operation.
   1. Provide sufficient number of operators to achieve unrestricted movement throughout damper range.
   2. Provide one operator for maximum 36 sq ft damper section.

2.06 HVAC&R SENSORS

A. Temperature Sensors:
   1. Use thermistor or RTD type temperature sensing elements with characteristics resistant to moisture, vibration, and other conditions consistent with the application without affecting accuracy and life expectancy.
   2. Construct RTD of nickel or platinum with base resistance of 1000 ohms at 70 degrees F.
   3. 100 ohm platinum RTD is acceptable if used with project DDC controllers.
   4. Temperature Sensing Device: Compatible with project DDC controllers.
   5. Performance Characteristics:
      a. Sensing Range:
         1) Provide limited range sensors if required to sense the range expected for a respective point.
      b. Wire Resistance:
         1) Use appropriate wire size to limit temperature offset due to wire resistance to 1.0 degree F or use temperature transmitter when offset is greater than 1.0 degree F due to wire resistance.
         2) Compensate for wire resistance in software input definition when feature is available in the DDC controller.
      c. Outside Air Sensors: Watertight inlet fitting shielded from direct rays of the sun.
      d. Immersion Temperature Sensors: A sensor encased in a corrosion-resistant probe with an indoor junction box service entry body.
   6. Room sensors:
      a. Office areas: Provide sensor with LCD display showing current temperature. Sensor shall be equipped with communication connection, night setback override button and setpoint adjustment.
      b. Classrooms: Sensor shall be equipped with communication connection, night setback override button and setpoint adjustment.

c. All other areas: Brushed stainless steel single gang cover plate with communication connection and night setback override button.

B. Static Pressure (Air Pressure) Sensors:
1. Unidirectional with ranges not exceeding 150 percent of maximum expected input.
2. Temperature compensate with typical thermal error or 0.06 percent of full scale in temperature range of 40 to 100 degrees F.
3. Accuracy: One percent of full scale with repeatability 0.3 percent.
4. Output: 0 to 5 vdc with power at 12 to 28 vdc.

C. Current Sensors:
1. Status Inputs for Fans: Differential pressure switch with adjustable range of 0 to 5 in-wc.
2. Status Inputs for Pumps: Differential pressure switch piped across pump with adjustable pressure differential range of 8 to 60 psi.
3. Status Inputs for Electric Motors: Current sensing relay with current transformers, adjustable and set to 175 percent of rated motor current.

2.07 THERMOSTATS

A. Electric Room Thermostats:
1. Type: NEMA BS 31032, 24 volts, with setback/setup temperature control.
2. Service: Cooling only.
3. Covers: Locking with set point adjustment, with thermometer.

B. Line Voltage Thermostats:
1. Integral manual On/Off/Auto selector switch, single or two pole as required.
2. Dead Band: Maximum 2 degrees F.
3. Cover: Locking with set point adjustment, with thermometer.
4. Rating: Motor load.

C. Room Thermostat Accessories:
1. Thermostat Covers: Brushed aluminum.
2. Insulating Bases: For thermostats located on exterior walls.
3. Thermostat Guards: Metal mounted on separate base.

D. Outdoor Reset Thermostats:
1. Remote bulb or bimetal rod and tube type, proportioning action with adjustable throttling range, adjustable setpoint.
2. Scale range: Minus 10 to 70 degrees F.

E. Immersion Thermostats:
1. Remote bulb or bimetallic rod and tube type, proportional action with adjustable setpoint and adjustable throttling range.

F. Airstream Thermostats:
1. Remote bulb or bimetallic rod and tube type, proportional action with adjustable setpoint in middle of range and adjustable throttling range.
2. Averaging service remote bulb element: 7.5 feet.

G. Electric High/Low Limit Duct Thermostats:
1. Snap acting, single pole, single throw, manual reset switch that trips if temperature sensed across any 12 inches of bulb length is above, equal to, or below setpoint,
2. Bulb length: Minimum 20 feet.
3. Provide one thermostat for every 20 sq ft of coil surface.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.
B. Verify that systems are ready to receive work.
C. Beginning of installation means installer accepts existing conditions.
D. Sequence work to ensure installation of components is complementary to installation of similar components in other systems.
E. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.
F. Ensure installation of components is complementary to installation of similar components.
G. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Check and verify location of thermostats with plans and room details before installation. Locate 48 inches above floor. Align with lighting switches. Refer to Section 262726.
C. Mount freeze protection thermostats using flanges and element holders.
D. Mount outdoor reset thermostats and outdoor sensors indoors, with sensing elements outdoors with sun shield.
E. Provide separable sockets for liquids and flanges for air bulb elements.
F. Provide guards on thermostats in entrances.
G. Provide mixing dampers of opposed blade construction arranged to mix streams. Provide pilot positioners on mixed air damper motors.
H. Provide isolation (two position) dampers of parallel blade construction.
I. Install damper motors on outside of duct in warm areas. Do not install motors in locations at outdoor temperatures.
J. Mount control panels adjacent to associated equipment on vibration free walls or free standing angle iron supports. One cabinet may accommodate more than one system in same equipment room. Provide engraved plastic nameplates for instruments and controls inside cabinet and engraved plastic nameplates on cabinet face.
K. Install "hand/off/auto" selector switches to override automatic interlock controls when switch is in "hand" position.
L. Provide conduit and electrical wiring in accordance with Section 260583. Electrical material and installation shall be in accordance with appropriate requirements of Division 26.
M. Wiring requirements.
    1. All Work shall conform to the requirements of NFPA 70.
    2. Power wiring shall be installed within full metallic raceway. Refer to sections 260529, 260553, 260519, 260534, 260535 and 260537 for specific requirements. Provide all wiring, conduit and circuit breakers required for a fully functional installation.
    3. Exposed wiring installed in finished areas shall be installed within surface metallic raceways. Refer to section 260535 for specific requirements.
    4. Low voltage cabling installed less than 10'-0" above finished floor elevation in mechanical areas shall be installed in metallic raceway. Wiring installed above that elevation may be installed exposed.

5. Low voltage cabling concealed in walls shall be installed in full metallic raceway. Conduit shall terminate above suspended ceilings with conduit bushing.
6. Low voltage cabling concealed by suspended ceilings may be installed exposed above ceiling.
7. All exposed low voltage cabling shall be supported on 4'-0" center to center intervals with Erico Cablecat 2" J Hooks. Install tye-wraps around all J hooks upon completion of cable pulls. Provide all necessary mounting hardware.
8. All new conduit shall be blue True Color conduit. Refer to section 260553 for additional information.

END OF SECTION

SECTION 230923 - DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. System description.
B. Operator interface.
C. Controllers.
D. Power supplies and line filtering.
E. System software.
F. Controller software.
G. HVAC control programs.
H. Control equipment.
I. Software.

1.02 RELATED REQUIREMENTS

A. Section 230913 - Instrumentation and Control Devices for HVAC.
B. Section 230993 - Sequence of Operations for HVAC Controls.
C. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. ASHRAE Std 135 - A Data Communication Protocol for Building Automation and Control Networks; 2020, with Errata (2023).
B. MIL-STD-810 - Environmental Engineering Considerations and Laboratory Tests; 2019h.
C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
D. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 SUBMITTALS

A. Product Data: Provide data for each system component and software module.
B. Owner Coordination Meeting: Schedule meeting with the Owner as soon as possible to coordinate all specific operational characteristics. These characteristics shall include, but shall not be limited to, the following:
    1. Time schedules
    2. Initial trend logs
    3. Setpoint adjustments
    4. Location of all temperature control devices
    5. Types and requiements for all space air temperatures.
C. Shop Drawings:
    1. Indicate trunk cable schematic showing programmable control unit locations, and trunk data conductors.
    2. List connected data points, including connected control unit and input device.
    3. Indicate system graphics indicating monitored systems, data (connected and calculated) point addresses, and operator notations. Provide demonstration digital media containing graphics.

4. Show system configuration with peripheral devices, batteries, power supplies, diagrams, modems, and interconnections.
5. Indicate description and sequence of operation of operating, user, and application software.

D. Manufacturer's Instructions: Indicate manufacturer's installation instructions for all manufactured components.

E. Project Record Documents: Record actual locations of control components, including control units, thermostats, and sensors.
1. Revise shop drawings to reflect actual installation and operating sequences.
2. Include submittals data in final "Record Documents" form.

F. Operation and Maintenance Data:
1. Include interconnection wiring diagrams complete field installed systems with identified and numbered, system components and devices.
2. Include keyboard illustrations and step-by-step procedures indexed for each operator function.
3. Include inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.

G. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in the Owner's name and registered with the Manufacturer.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with NFPA 70.

B. Designer Qualifications: Perform design of system using manufacturer's software under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.

D. Installer Qualifications: Company specializing in performing work of the type specified and with minimum three years of documented experience.

E. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for purpose specified and indicated.

1.06 PRE-INSTALLATION MEETING

A. Convene one week before starting work of this Section.

B. Require attendance of parties directly affecting the work of this Section.

C. Time and location of meeting shall be coordinated with the Architect two weeks prior to proposed meeting date.

1.07 WARRANTY

A. Correct defective Work within a two year period after Substantial Completion.

B. Provide five year manufacturer's warranty for field programmable micro-processor based units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Johnson Controls, Inc Local Branch.

1. Contact Josef Rice, josef.rice@jci.com, (224) 527-6620

2.02 SYSTEM DESCRIPTION

A. Automatic temperature control field monitoring and control system using field programmable micro-processor based units.

B. Base system on distributed system of fully intelligent, stand-alone controllers, operating in a multi-tasking, multi-user environment on token passing network, with central and remote hardware, software, and interconnecting wire and conduit.

C. Include computer software and hardware, operator input/output devices, control units, local area networks (LAN), sensors, control devices, actuators.

D. Provide control systems consisting of thermostats, control valves, dampers and operators, indicating devices, interface equipment and other apparatus and accessories required to operate mechanical systems, and to perform functions specified.

E. Include installation and calibration, supervision, adjustments, and fine tuning necessary for complete and fully operational system.

F. The system shall be capable of sending all alarm messages as e-mail or text messages through the internet connection. All alarm requirements shall be coordinated with the Owner prior to final system setup. Provide all software, programming, wiring and devices required for a fully functional installation.

G. All new equipment shall be an extension of the existing BMS. Provide all wiring, conduit, devices and software required to fully integrate all new equipment into the existing system. Where existing systems do not have the capacity for expansion, provide complete new system and integrate all existing equipment into the new system.

H. The Contractor must review all equipment provided with packaged controls prior to bidding. All points listed in the sequences of operation must be provided. The Contractor shall provide all additional devices, wiring and programming required to provide the specified points and sequences of operation.

I. The Contractor shall be responsible to provide all devices, wiring, conduit and associated equipment required for a fully functional installation.

2.03 OPERATOR INTERFACE

A. ExistingPC Based Work Station:
   1. Resides on high speed network with building controllers.
   2. Connected to server for full access to all system information.

B. Workstation, controllers, and control backbone to communicate using BACnet protocol and addressing.

C. BACnet protocol to comply with ASHRAE Std 135.

2.04 CONTROLLERS

A. Building Controllers:
   1. General:
      a. Manage global strategies by one or more, independent, standalone, microprocessor based controllers.
      b. Provide sufficient memory to support controller's operating system, database, and programming requirements.
      c. Share data between networked controllers.

d. Controller operating system manages input and output communication signals allowing distributed controllers to share real and virtual object information and allowing for central monitoring and alarms.
e. Utilize real-time clock for scheduling.
f. Continuously check processor status and memory circuits for abnormal operation.
g. Controller to assume predetermined failure mode and generate alarm notification upon detection of abnormal operation.
h. Communication with other network devices to be based on assigned protocol.

2. Communication:
a. Controller to reside on a BACnet network using ISO 8802-3 (ETHERNET) Data Link/Physical layer protocol.
b. Perform routing when connected to a network of custom application and application specific controllers.
c. Provide service communication port for connection to a portable operator's terminal or hand held device with compatible protocol.

3. Anticipated Environmental Ambient Conditions:
a. Outdoors and/or in Wet Ambient Conditions:
1) Mount within waterproof enclosures.
2) Rated for operation at 40 to 150 degrees F.
b. Conditioned Space:
1) Mount within dustproof enclosures.
2) Rated for operation at 32 to 120 degrees F.

4. Provisions for Serviceability:
a. Diagnostic LEDs for power, communication, and processor.
b. Make all wiring connections to field removable, modular terminal strips, or to a termination card connected by a ribbon cable.

5. Memory: In the event of a power loss, maintain all BIOS and programming information for a minimum of 72 hours.

6. Power and Noise Immunity:
a. Maintain operation at 90 to 110 percent of nominal voltage rating.
b. Perform orderly shutdown below 80 percent of nominal voltage.
c. Operation protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W. at 3 feet.

B. Custom Application Controller:

1. General:
a. Provide sufficient memory to support controller's operating system, database, and programming requirements.
b. Share data between networked, microprocessor based controllers.
c. Controller operating system manages input and output communication signals allowing distributed controllers to share real and virtual object information and allowing for central monitoring and alarms.
d. Utilize real-time clock for scheduling.
e. Continuously check processor status and memory circuits for abnormal operation.
f. Controller to assume predetermined failure mode and generate alarm notification upon detection of abnormal operation.

g. Communication with other network devices to be based on assigned protocol.

2. Communication:
   a. Controller to reside on a BACnet network using MS/TP Data Link/Physical layer protocol.
   b. Provide service communication port for connection to a portable operator's terminal or hand held device with compatible protocol.
3. Anticipated Environmental Ambient Conditions:
   a. Outdoors and/or in Wet Ambient Conditions:
      1) Mount within waterproof enclosures.
      2) Rated for operation at 40 to 150 degrees F.
   b. Conditioned Space:
      1) Mount within dustproof enclosures.
      2) Rated for operation at 32 to 120 degrees F.
4. Provisions for Serviceability:
   a. Diagnostic LED's for power, communication, and processor.
   b. Make all wiring connections to field removable, modular terminal strips, or to a termination card connected by a ribbon cable.
5. Memory: In the event of a power loss, maintain all BIOS and programming information for a minimum of 72 hours.
6. Power and Noise Immunity:
   a. Maintain operation at 90 to 110 percent of nominal voltage rating.
   b. Perform orderly shutdown below 80 percent of nominal voltage.
   c. Operation protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W. at 3 feet.

C. Application Specific Controllers:
1. General:
   a. Not fully user programmable, microprocessor based controllers dedicated to control specific equipment.
   b. Customized for operation within the confines of equipment served.
   c. Communication with other network devices to be based on assigned protocol.
2. Communication:
   a. Controller to reside on a BACnet network using MS/TP Data Link/Physical layer protocol.
   b. Provide service communication port for connection to a portable operator's terminal or hand held device with compatible protocol.
3. Anticipated Environmental Ambient Conditions:
   a. Outdoors and/or in Wet Ambient Conditions:
      1) Mount within waterproof enclosures.
      2) Rated for operation at 40 to 150 degrees F.
   b. Conditioned Space:
      1) Mount within dustproof enclosures.
      2) Rated for operation at 32 to 120 degrees F.
4. Provisions for Serviceability:
   a. Diagnostic LEDs for power, communication, and processor.

b. Make all wiring connections to field removable, modular terminal strips, or to a termination card connected by a ribbon cable.

5. Memory: In the event of a power loss, maintain all BIOS and programming information for a minimum of 72 hours.
6. Power and Noise Immunity:
   a. Maintain operation at 90 to 110 percent of nominal voltage rating.
   b. Perform orderly shutdown below 80 percent of nominal voltage.
   c. Operation protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W at 3 feet.

D. Input/Output Interface:
1. Hardwired inputs and outputs tie into the DDC system through building, custom application, or application specific controllers.
2. All Input/Output Points:
   a. Protect controller from damage resulting from any point short-circuiting or grounding and from voltage up to 24 volts of any duration.
   b. Provide universal type for building and custom application controllers where input or output is software designated as either binary or analog type with appropriate properties.
3. Binary Inputs:
   a. Allow monitoring of On/Off signals from remote devices.
   b. Provide wetting current of 12 mA minimum, compatible with commonly available control devices and protected against the effects of contact bounce and noise.
   c. Sense dry contact closure with power provided only by the controller.
4. Pulse Accumulation Input Objects: Comply with all requirements of binary input objects and accept up to 10 pulses per second.
5. Analog Inputs:
   a. Allow for monitoring of low voltage 0 to 10 VDC, 4 to 20 mA current, or resistance signals (thermistor, RTD).
   b. Compatible with and field configurable to commonly available sensing devices.
6. Binary Outputs:
   a. Used for On/Off operation or a pulsed low-voltage signal for pulse width modulation control.
   b. Outputs provided with three position (On/Off/Auto) override switches.
   c. Status lights for building and custom application controllers to be selectable for normally open or normally closed operation.
7. Analog Outputs:
   a. Monitoring signal provides a 0 to 10 VDC or a 4 to 20 mA output signal for end device control.
   b. Provide status lights and two position (AUTO/MANUAL) switch for building and custom application controllers with manually adjustable potentiometer for manual override on building and custom application controllers.
   c. Drift to not exceed 0.4 percent of range per year.
8. Tri State Outputs:
   a. Coordinate two binary outputs to control three point, floating type, electronic actuators without feedback.

b. Limit the use of three point, floating devices to the following zone and terminal unit control applications:
c. Control algorithms run the zone actuator to one end of its stroke once every 24 hours for verification of operator tracking.

9. System Object Capacity:
   a. System size to be expandable to twice the number of input output objects required by providing additional controllers, including associated devices and wiring.
   b. Hardware additions or software revisions for the installed operator interfaces are not to be required for future, system expansions.

2.05 POWER SUPPLIES AND LINE FILTERING

A. Power Supplies:
   1. Provide UL listed control transformers with Class 2 current limiting type or over-current protection in both primary and secondary circuits for Class 2 service as required by the NEC.
   2. Limit connected loads to 80 percent of rated capacity.
   3. Match DC power supply to current output and voltage requirements.
   4. Unit to be full wave rectifier type with output ripple of 5.0 mV maximum peak to peak.
   5. Regulation to be 1 percent combined line and load with 100 microsecond response time for 50 percent load changes.
   6. Provide over-voltage and over-current protection to withstand a 150 percent current overload for 3 seconds minimum without trip-out or failure.
   7. Operational Ambient Conditions: 32 to 120 degrees F.
   8. EM/RF meets FCC Class B and VDE 0871 for Class B and MIL-STD-810 for shock and vibration.
   9. Line voltage units UL recognized and CSA approved.

B. Power Line Filtering:
   1. Provide external or internal transient voltage and surge suppression component for all workstations and controllers.
   2. Minimum surge protection attributes:
      a. Dielectric strength of 1000 volts minimum.
      b. Response time of 10 nanoseconds or less.
      c. Transverse mode noise attenuation of 65 dB or greater.
      d. Common mode noise attenuation of 150 dB or greater at 40 to 100 Hz.

2.06 LOCAL AREA NETWORK (LAN)

A. Provide communication between control units over local area network (LAN).
B. LAN Capacity: Not less than 60 stations or nodes.
C. Break in Communication Path: Alarm and automatically initiate LAN reconfiguration.
D. LAN Data Speed: Minimum 19.2 Kb.
E. Communication Techniques: Allow interface into network by multiple operation stations and by auto-answer/auto-dial modems. Support communication over telephone lines utilizing modems.
F. Transmission Median: Fiber optic or single pair of solid 24 gauge twisted, shielded copper cable.

G. Network Support: Time for global point to be received by any station, shall be less than 3 seconds. Provide automatic reconfiguration if any station is added or lost. If transmission cable is cut, reconfigure two sections with no disruption to system's operation, without operator intervention.

2.07 SYSTEM SOFTWARE

A. Operating System:
   1. Concurrent, multi-tasking capability.
   2. System Graphics:
      a. Allow up to 10 graphic screens, simultaneously displayed for comparison and monitoring of system status.
      b. Animation displayed by shifting image files based on object status.
      c. Provide method for operator with password to perform the following:
         1) Move between, change size, and change location of graphic displays.
         2) Modify on-line.
         3) Add, delete, or change dynamic objects consisting of:
            (a) Analog and binary values.
            (b) Dynamic text.
            (c) Static text.
            (d) Animation files.
   3. Custom Graphics Generation Package:
      a. Create, modify, and save graphic files and visio format graphics in PCX formats.
      b. HTML graphics to support web browser compatible formats.
      c. Capture or convert graphics from AutoCAD.

B. Workstation System Applications:
   1. Automatic System Database Save and Restore Functions:
      a. Current database copy of each Building Controller is automatically stored on hard disk.
      b. Automatic update occurs upon change in any system panel.
      c. In the event of database loss in any system panel, the first workstation to detect the loss automatically restores the database for that panel unless disabled by the operator.
   2. Manual System Database Save and Restore Functions by Operator with Password Clearance:
      a. Save database from any system panel.
      b. Clear a panel database.
      c. Initiate a download of a specified database to any system panel.
   3. Software provided allows system configuration and future changes or additions by operators under proper password protection.
   4. On-line Help:
      a. Context-sensitive system assists operator in operation and editing.
      b. Available for all applications.
      c. Relevant screen data provided for particular screen display.
      d. Additional help available via hypertext.
   5. Security:
      a. Operator log-on requires user name and password to view, edit, add, or delete data.

b. System security selectable for each operator.
c. System supervisor sets passwords and security levels for all other operators.
d. Operator passwords to restrict functions accessible to viewing and/or changing system applications, editor, and object.
e. Automatic, operator log-off results from keyboard or mouse inactivity during user-adjustable, time period.
f. All system security data stored in encrypted format.

6. System Diagnostics:
   a. Operations Automatically Monitored:
      1) Workstations.
      2) Printers.
      3) Modems.
      4) Network connections.
      5) Building management panels.
      6) Controllers.
   b. Device failure is annunciated to the operator.
7. Alarm Processing:
   a. All system objects are configurable to "alarm in" and "alarm out" of normal state.
   b. Configurable Objects:
      1) Alarm limits.
      2) Alarm limit differentials.
      3) States.
      4) Reactions for each object.
8. Alarm Messages:
   a. Descriptor: English language.
   b. Recognizable Features:
      1) Source.
      2) Location.
      3) Nature.
9. Configurable Alarm Reactions by Workstation and Time of Day:
   a. Logging.
   b. Printing.
   c. Starting programs.
   d. Displaying messages.
   e. Dialing out to remote locations.
   f. Paging.
   g. Providing audible annunciation.
   h. Displaying specific system graphics.
10. Custom Trend Logs:
    a. Definable for any data object in the system including interval, start time, and stop time.
    b. Trend Data:
       1) Sampled and stored on the building controller panel.

2) Archivable on hard disk.
3) Retrievable for use in reports, spreadsheets and standard database programs.
4) Archival on LAN accessible storage media including hard disk, tape, Raid array drive, and virtual cloud environment.
5) Protected and encrypted format to prevent manipulation, or editing of historical data and event logs.

11. Alarm and Event Log:
    a. View all system alarms and change of states from any system location.
    b. Events listed chronologically.
    c. Operator with proper security acknowledges and clears alarms.
    d. Alarms not cleared by operator are archived to the workstation hard disk.
12. Object, Property Status and Control:
    a. Provide a method to view, edit if applicable, the status of any object and property in the system.
    b. Status Available by the Following Methods:
        1) Menu.
        2) Graphics.
        3) Custom Programs.
13. Reports and Logs:
    a. Reporting Package:
        1) Allows operator to select, modify, or create reports.
        2) Definable as to data content, format, interval, and date.
        3) Archivable to hard disk.
    b. Real-time logs available by type or status such as alarm, lockout, normal, etc.
    c. Stored on hard disk and readily accessible by standard software applications, including spreadsheets and word processing.
    d. Set to be printed on operator command or specific time(s).
14. Reports:
    a. Standard:
        1) Objects with current values.
        2) Current alarms not locked out.
        3) Disabled and overridden objects, points and SNVTs.
        4) Objects in manual or automatic alarm lockout.
        5) Objects in alarm lockout currently in alarm.
        6) Logs:
            (a) Alarm History.
            (b) System messages.
            (c) System events.
            (d) Trends.
    b. Custom:
        1) Daily.
        2) Weekly.

3) Monthly.
4) Annual.
5) Time and date stamped.
6) Title.
7) Facility name.

c. Tenant Override:
1) Monthly report showing total, requested, after-hours HVAC and lighting services on a daily basis for each tenant.
2) Annual report showing override usage on a monthly basis.

d. Electrical, Fuel, and Weather:
1) Electrical Meter(s):
(a) Monthly showing daily electrical consumption and peak electrical demand with time and date stamp for each meter.
(b) Annual summary showing monthly electrical consumption and peak demand with time and date stamp for each meter.
2) Fuel Meter(s):
(a) Monthly showing daily natural gas consumption for each meter.
(b) Annual summary showing monthly consumption for each meter.
3) Weather:
(a) Monthly showing minimum, maximum, average outdoor air temperature and heating/cooling degree-days for the month.

C. Workstation Applications Editors:
1. Provide editing software for each system application at PC workstation.
2. Downloaded application is executed at controller panel.
3. Full screen editor for each application allows operator to view and change:
a. Configuration.
b. Name.
c. Control parameters.
d. Set-points.
4. Scheduling:
a. Monthly calendar indicates schedules, holidays, and exceptions.
b. Allows several related objects to be scheduled and copied to other objects or dates.
c. Start and stop times adjustable from master schedule.
5. Custom Application Programming:
a. Create, modify, debug, edit, compile, and download custom application programming during operation and without disruption of all other system applications.
b. Programming Features:
1) English oriented language, based on BASIC, FORTRAN, C, or PASCAL syntax allowing for free form programming.
2) Alternative language graphically based using appropriate function blocks suitable for all required functions and amenable to customizing or compounding.
3) Insert, add, modify, and delete custom programming code that incorporates word processing features such as cut/paste and find/replace.

4) Allows the development of independently, executing, program modules designed to enable and disable other modules.
5) Debugging/simulation capability that displays intermediate values and/or results including syntax/execution error messages.
6) Support for conditional statements (IF/THEN/ELSE/ELSE-F) using compound Boolean (AND, OR, and NOT) and/or relations (EQUAL, LESS THAN, GREATER THAN, NOT EQUAL) comparisons.
7) Support for floating-point arithmetic utilizing plus, minus, divide, times, square root operators; including absolute value; minimum/maximum value from a list of values for mathematical functions.
8) Language consisting of resettable, predefined, variables representing time of day, day of the week, month of the year, date; and elapsed time in seconds, minutes, hours, and days where the variable values cab be used in IF/THEN comparisons, calculations, programming statement logic, etc.
9) Language having predefined variables representing status and results of the system software enables, disables, and changes the set points of the controller software.

2.08 CONTROLLER SOFTWARE

A. All applications reside and operate in the system controllers and editing of all applications occurs at the operator workstation.
B. System Security:
   1. User access secured via user passwords and user names.
   2. Passwords restrict user to the objects, applications, and system functions as assigned by the system manager.
   3. User Log On/Log Off attempts are recorded.
   4. Automatic Log Off occurs following the last keystroke after a user defined delay time.
C. Object or Object Group Scheduling:
   1. Weekly Schedules Based on Separate, Daily Schedules:
      a. Include start, stop, optimal stop, and night economizer.
      b. 10 events maximum per schedule.
      c. Start/stop times adjustable for each group object.
D. Provide standard application for equipment coordination and grouping based on function and location to be used for scheduling and other applications.
E. Alarms:
   1. Binary object is set to alarm based on the operator specified state.
   2. Analog object to have high/low alarm limits.
   3. All alarming is capable of being automatically and manually disabled.
   4. Alarm Reporting:
      a. Operator determines action to be taken for alarm event.
      b. Alarms to be routed to appropriate workstation.
      c. Reporting Options:
F. Maintenance Management: System monitors equipment status and generates maintenance messages based upon user-designated run-time limits.

G. Sequencing: Application software based upon specified sequences of operation in Section 230993.

H. PID Control Characteristics:
   1. Direct or reverse action.
   2. Anti-windup.
   3. Calculated, time-varying, analog value, positions an output or stages a series of outputs.
   4. User selectable controlled variable, set-point, and PED gains.

I. Staggered Start Application:
   1. Prevents all controlled equipment from simultaneously restarting after power outage.
   2. Order of equipment startup is user selectable.

J. Energy Calculations:
   1. Accumulated instantaneous power or flow rates are converted to energy use data.
   2. Algorithm calculates a rolling average and allows window of time to be user specified in minute intervals.
   3. Algorithm calculates a fixed window average with a digital input signal from a utility meter defining the start of the window period that in turn synchronizes the fixed-window average with that used by the power company.

K. Anti-Short Cycling:
   1. All binary output objects protected from short-cycling.
   2. Allows minimum on-time and off-time to be selected.

L. On-Off Control with Differential:
   1. Algorithm allows binary output to be cycled based on a controlled variable and set-point.
   2. Algorithm to be direct-acting or reverse-acting incorporating an adjustable differential.

M. Run-Time Totalization:
   1. Totalize run-times for all binary input objects.
   2. Provides operator with capability to assign high run-time alarm.

2.09 HVAC CONTROL PROGRAMS

A. General:
   1. Support Inch-pounds and SI (metric) units of measurement.
   2. Identify each HVAC Control system.

B. Optimal Run Time:
   1. Control start-up and shutdown times of HVAC equipment for both heating and cooling.
   2. Base on occupancy schedules, outside air temperature, seasonal requirements, and interior room mass temperature.
   3. Start-up systems by using outside air temperature, room mass temperatures, and adaptive model prediction for how long building takes to warm up or cool down under different conditions.
   4. Use outside air temperature to determine early shut down with ventilation override.
   5. Analyze multiple building mass sensors to determine seasonal mode and worse case condition for each day.
   6. Operator commands:
      a. Define term schedule.
      b. Add/delete fan status point.
      c. Add/delete outside air temperature point.

d. Add/delete mass temperature point.
e. Define heating/cooling parameters.
f. Define mass sensor heating/cooling parameters.
g. Lock/unlock program.
h. Request optimal run time control summary.
i. Request optimal run time mass temperature summary.
j. Request HVAC point summary.
k. Request HVAC saving profile summary.

7. Control Summary:
   a. HVAC Control system begin/end status.
   b. Optimal run time lock/unlock control status.
   c. Heating/cooling mode status.
   d. Optimal run time schedule.
   e. Start/Stop times.
   f. Selected mass temperature point ID.
   g. Optimal run time system normal start times.
   h. Occupancy and vacancy times.
   i. Optimal run time system heating/cooling mode parameters.
8. Mass temperature summary:
   a. Mass temperature point type and ID.
   b. Desired and current mass temperature values.
   c. Calculated warm-up/cool-down time for each mass temperature.
   d. Heating/cooling season limits.
   e. Break point temperature for cooling mode analysis.
9. HVAC point summary:
   a. Control system identifier and status.
   b. Point ID and status.
   c. Outside air temperature point ID and status.
   d. Mass temperature point ID and point.
   e. Calculated optimal start and stop times.
   f. Period start.

C. Supply Air Reset:
1. Monitor heating and cooling loads in building spaces, terminal reheat systems, both hot deck and cold deck temperatures on dual duct and multizone systems, single zone unit discharge temperatures.
2. Adjust discharge temperatures to most energy efficient levels satisfying measured load by:
   a. Raising cooling temperatures to highest possible value.
   b. Reducing heating temperatures to lowest possible level.
3. Operator commands:
   a. Add/delete fan status point.
   b. Lock/unlock program.
   c. Request HVAC point summary.
   d. Add/Delete discharge controller point.
   e. Define discharge controller parameters.

f. Add/delete air flow rate.
g. Define space load and load parameters.
h. Request space load summary.

4. Control summary:
   a. HVAC control system status (begin/end).
   b. Supply air reset system status.
   c. Optimal run time system status.
   d. Heating and cooling loop.
   e. High/low limits.
   f. Deadband.
   g. Response timer.
   h. Reset times.
5. Space load summary:
   a. HVAC system status.
   b. Optimal run time status.
   c. Heating/cooling loop status.
   d. Space load point ID.
   e. Current space load point value.
   f. Control heat/cool limited.
   g. Gain factor.
   h. Calculated reset values.
   i. Fan status point ID and status.
   j. Control discharge temperature point ID and status.
   k. Space load point ID and status.
   l. Air flow rate point ID and status.

D. Enthalpy Switchover:
1. Calculate outside and return air enthalpy using measured temperature and relative humidity; determine energy expended and control outside and return air dampers.
2. Operator commands:
   a. Add/delete fan status point.
   b. Add/delete outside air temperature point.
   c. Add/delete discharge controller point.
   d. Define discharge controller parameters.
   e. Add/delete return air temperature point.
   f. Add/delete outside air dew point/humidity point.
   g. Add/delete return air dew point/humidity point.
   h. Add/delete damper switch.
   i. Add/delete minimum outside air.
   j. Add/delete atmospheric pressure.
   k. Add/delete heating override switch.
   l. Add/delete evaporative cooling switch.
   m. Add/delete air flow rate.
   n. Define enthalpy deadband.
   o. Lock/unlock program.

p. Request control summary.
q. Request HVAC point summary.

3. Control summary:
   a. HVAC control system begin/end status.
   b. Enthalpy switchover optimal system status.
   c. Optimal return time system status.
   d. Current outside air enthalpy.
   e. Calculated mixed air enthalpy.
   f. Calculated cooling cool enthalpy using outside air.
   g. Calculated cooling cool enthalpy using mixed air.
   h. Calculated enthalpy difference.
   i. Enthalpy switchover deadband.
   j. Status of damper mode switch.

2.10 PROGRAMMING APPLICATION FEATURES

A. Trend Point:
   1. Sample up to 64 points, real or computed, with each point capable of collecting 24 samples at intervals specified in minutes, hours, days, or month.
   2. Output trend logs as line graphs or bar graphs. Output graphic on terminal, with each point for line and bar graphs designated with a unique pattern, vertical scale either actual values or percent of range, and horizontal scale time base. Print trend logs up to 12 columns of one point/column.

B. Alarm Messages:
   1. Allow definition of minimum of 8 messages, each having minimum length of 256 characters for each individual message.
   2. Assign alarm messages to system messages including point's alarm condition, point's off-normal condition, totalized point's warning limit, hardware elements advisories.
   3. Output assigned alarm with "message requiring acknowledgement".
   4. Operator commands include define, modify, or delete; output summary listing current alarms and assignments; output summary defining assigned points.

C. Weekly Scheduling:
   1. Automatically initiate equipment or system commands, based on preselected time schedule for points specified.
   2. Provide program times for each day of week, per point, with one minute resolution.
   3. Automatically generate alarm output for points not responding to command.
   4. Provide for holidays, minimum of 366 consecutive holidays.
   5. Operator commands:
      a. System logs and summaries.
      b. Start of stop point.
      c. Lock or unlock control or alarm input.
      d. Add, delete, or modify analog limits and differentials.
      e. Adjust point operation position.
      f. Change point operational mode.
      g. Open or close point.
      h. Enable/disable, lock/unlock, or execute interlock sequence or computation profile.

i. Begin or end point totalization.
j. Modify totalization values and limits.
k. Access or secure point.
l. Begin or end HVAC or load control system.
m. Modify load parameter.
n. Modify demand limiting and duty cycle targets.

6. Output summary: Listing of programmed function points, associated program times, and respective day of week programmed points by software groups or time of day.

D. Interlocking:
1. Permit events to occur, based on changing condition of one or more associated master points.
2. Binary contact, high/low limit of analog point or computed point shall be capable of being utilized as master. Same master may monitor or command multiple slaves.
3. Operator commands:
a. Define single master/multiple master interlock process.
b. Define logic interlock process.
c. Lock/unlock program.
d. Enable/disable interlock process.
e. Execute terminate interlock process.
f. Request interlock type summary.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.
B. Verify that conditioned power supply is available to the control units and to the operator work station. Verify that field end devices, wiring, and pneumatic tubing is installed prior to installation proceeding.

3.02 INSTALLATION

A. Install control units and other hardware in position on permanent walls where not subject to excessive vibration.
B. Install software in control units and in operator work station. Implement all features of programs to specified requirements and appropriate to sequence of operation. Refer to Section 230993.
C. Provide with 120v AC, 15 amp dedicated emergency power circuit to each programmable control unit.
D. Provide conduit and electrical wiring in accordance with Section 260583. Electrical material and installation shall be in accordance with appropriate requirements of Division 26.
E. Provide conduit and wiring in accordance with section 230913.

3.03 MANUFACTURER'S FIELD SERVICES

A. Start and commission systems. Allow sufficient time for start-up and commissioning prior to placing control systems in permanent operation. Provide a point by point commissioning report for each and every point in this system.

B. Provide basic operator training for 4 persons on data display, alarm and status descriptors, requesting data, execution of commands and request of logs. Include a minimum of 8 hours dedicated instructor time. Provide training on site.

C. Provide full color dynamic graphics of the entire building system and each subsystem and its associated control points. Graphics shall include, but shall not be limited to, the following:

1. Front page showing the Owner's name, building location and date of installation.
2. Floor plan(s) of the entire building showing all equipment connected to the system. Equipment detail shall be accessed through the floor plan.
3. Separate page for each piece of equipment. Page shall include all points listed on the Drawings.

3.04 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate complete and operating system to Owner.

END OF SECTION

SECTION 230993 - SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section defines the manner and method by which controls function. Requirements for each type of control system operation are specified. Equipment, devices, and system components required for control systems are specified in other sections.
B. Sequence of operation for:
   1. All sequences can be found on the Drawings.

1.02 RELATED REQUIREMENTS

A. Section 230913 - Instrumentation and Control Devices for HVAC.
B. Section 262816.13 - Enclosed Circuit Breakers.

1.03 SUBMITTALS

A. Sequence of Operation Documentation: Submit written sequence of operation for entire HVAC system and each piece of equipment.
   1. Preface: 1 or 2 paragraph overview narrative of the system describing its purpose, components and function.
   2. State each sequence in small segments and give each segment a unique number for referencing in Functional Test procedures; provide a complete description regardless of the completeness and clarity of the sequences specified in Contract Documents.
   3. Include initial and recommended values for all adjustable settings, setpoints and parameters that are typically set or adjusted by operating staff; and any other control settings or fixed values, delays, etc. that will be useful during testing and operating the equipment.
   4. For packaged controlled equipment, include manufacturer's furnished sequence of operation amplified as required to describe the relationship between the packaged controls and the control system, indicating which points are adjustable control points and which points are only monitored.
B. Control System Diagrams: Submit graphic schematic of the control system showing each control component and each component controlled, monitored, or enabled.
   1. Label with settings, adjustable range of control and limits.
   2. Include flow diagrams for each control system, graphically depicting control logic.
   3. Include the system and component layout of all equipment that the control system monitors, enables or controls, even if the equipment is primarily controlled by packaged or integral controls.
   4. Include draft copies of graphic displays indicating mechanical system components, control system components, and controlled function status and value.
   5. Include all monitoring, control and virtual points specified in elsewhere.
   6. Include a key to all abbreviations.
C. Points List: Submit list of all control points indicating at least the following for each point.
   1. Name of controlled system.
   2. Point abbreviation.
   3. Point description; such as dry bulb temperature, airflow, etc.

4. Display unit.
5. Control point or setpoint (Yes / No); i.e. a point that controls equipment and can have its setpoint changed.
6. Monitoring point (Yes / No); i.e. a point that does not control or contribute to the control of equipment but is used for operation, maintenance, or performance verification.
7. Intermediate point (Yes / No); i.e. a point whose value is used to make a calculation which then controls equipment, such as space temperatures that are averaged to a virtual point to control reset.
8. Calculated point (Yes / No); i.e. a "virtual" point generated from calculations of other point values.

D. Project Record Documents: Record actual locations of components and setpoints of controls, including changes to sequences made after submission of shop drawings.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 231113 - GAS PIPING SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping and fittings.
B. Flanges and piping components.
C. Pipe hangers and supports.
D. Valves.
E. Flexible connectors.
F. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 230553 - HVAC Identification.

1.03 REFERENCE STANDARDS

A. ASME BPVC - Boiler and Pressure Vessel Code; 2021.
B. ASME B1.1 - Unified Inch Screw Threads (UN, UNR, and UNJ Thread Forms); 2019.
C. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2021.
D. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard; 2020.
E. ASME B16.9 - Factory-Made Wrought Buttwelding Fittings; 2018.
F. ASME B16.11 - Forged Fittings, Socket-Welding and Threaded; 2021.
G. ASME B16.39 - Malleable Iron Threaded Pipe Unions: Classes 150, 250, and 300; 2019.
H. ASME B18.2.1 - Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series); 2012 (Reaffirmed 2021).
I. ASME B18.2.2 - Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series); 2015.
J. ASME B31.1 - Power Piping; 2022.
K. ASME B31.3 - Process Piping; 2020.
L. ASME B36.10M - Welded and Seamless Wrought Steel Pipe; The American Society of Mechanical Engineers; 2004.
M. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.
N. ASTM A105/A105M - Standard Specification for Carbon Steel Forgings for Piping Applications; 2021.
O. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2023.
P. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.
Q. ASTM A733 - Standard Specification for Welded and Seamless Carbon Steel and Austenitic Stainless Steel Pipe Nipples; 2016.
R. ASTM B687 - Standard Specification for Brass, Copper, and Chromium-Plated Pipe Nipples; 1999 (Reapproved 2016).
S. ASTM F844 - Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use; 2019.

T. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).
U. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010, with Errata .
V. NFPA 30 - Flammable and Combustible Liquids Code; 2021, with Amendment.
W. NFPA-54 - Installation code for natural gas burning applications and equipment

1.04 SUBMITTALS

A. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
B. Shop Drawings: Indicate tanks, system layout, pipe sizes, location, and elevations. For fuel oil tanks, indicate dimensions and accessories, including manholes and hold down straps.
C. Certificates: Certify that products meet or exceed specified requirements.
D. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.
E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Welding Materials and Procedures: Comply with ASME BPVC.
B. Welders Certification: In accordance with ASME (BPV IX).
C. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
D. Installer Qualifications: Company specializing in performing the type of work specified in this section with minimum three years of experience.
E. Valves: Manufacturer's name and pressure rating marked on valve body.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect piping and fittings from soil and debris with temporary end caps and closures. Maintain in place until installation.

PART 2 PRODUCTS

2.01 PIPING AND FITTINGS

A. Regulatory Requirements:
    1. Comply with the material, fabrication, and operating requirements of ASME B31.3, except as modified herein.
    2. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.
B. Comply with the material, fabrication, and operating requirements of ASME B31.3, except as modified herein.
C. Carbon Steel Pipe:
    1. Comply with One of the Following:
        a. ASTM A53/A53M, Type E or S, Grade B, seamless or electric welded, Schedule 40.
    2. End Connections:

a. Buttweld type complying with ASTM A234/A234M, Grade WPB and ASME B16.9 for pipe or fittings 2-1/2 inches and larger of the same wall thickness as the adjoining pipe.
b. Threaded type complying with ASME B16.3, Class 150 or ASME B16.11.

2.02 FLANGES, COUPLINGS, AND PIPING COMPONENTS

A. Flanges:
1. Provide flanged end connections on equipment, fittings, piping, piping components, adapters, couplings, and valves complying with ASME B16.5, Class 150.
2. Carbon Steel: Comply with ASTM A105/A105M.
3. Gaskets, Non-Isolating:
a. 1/8 inch thick.
b. Comply with ASME B16.12, raised-faced type.
c. Material: Buna-N.
4. Bolts, Nuts, and Washers:
a. Comply with ASME B18.2.1 and ASME B18.2.2.
b. Bolts:
1) Regular hexagonal type.
2) Threaded in accordance with ASME B1.1, Class 2A fit, Coarse Thread Series, for sizes 1 inch and smaller and Eight-Pitch Thread Series for sizes larger than 1 inch.
3) Provide sufficient length to obtain full bearing on nuts, projecting no more than two full threads beyond nuts with bolts tightened to required torque.
c. Nuts:
1) Hexagonal, heavy series type.
2) Threaded in accordance with ASME B1.1, Class 2B fit, Coarse Thread Series for sizes 1 inch and smaller and Eight-Pitch Thread Series for sizes larger than 1 inch.

B. Piping Components:
1. Provide components that meet the material, fabrication, and operating requirements of ASME B31.3, except as modified herein.
2. Pressure Design Class: Class 150, as defined in ASME B16.5.
3. Welded Nipples: Comply with ASTM A733 or ASTM B687 and construct of same material as connecting pipe.
4. Threaded Unions:
a. Comply with ASME B16.39, Class 150.
b. Materials: Comply with ASTM A312/A312M, Grade 304 or 316.
c. Dielectric Unions: Comply with dimensional, strength, and pressure requirements of ASME B16.39, Class 150.
d. Provide plated steel parts.
e. Furnish water-impervious insulation barrier capable of limiting galvanic current to one percent of the short-circuit current in a corresponding bimetallic joint and withstand a 600-volt breakdown test when dry.
5. Joint Compound: Resistant to water and suitable for use with fuel containing 40 percent aromatics.

2.03 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports that comply with MSS SP-58.
   1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
B. Hangers for Pipe Sizes 1/2 to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
C. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
D. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
E. Vertical Support: Steel riser clamp.
F. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

2.04 GAS COCKS

A. Manufacturers:
   1. Stockham.
   2. Nibco, Inc: www.nibco.com.
   3. Milwaukee Valve Company: www.milwaukeevalve.com.
B. Up to 2 inches: Bronze body, Bronze tapered plug, Non-lubricated, teflon packing, threaded ends.
C. Over 2 inches: Cast iron body and plug, non-lubricated, teflon packing, flanged ends.

2.05 BALL VALVES

A. Manufacturers:
   1. Conbraco Industries: www.apollovalves.com.
   2. Nibco, Inc: www.nibco.com.
   3. Milwaukee Valve Company: www.milwaukeevalve.com.
B. MSS SP-110, Class 150, 400 psi CWP, bronze, two piece body, chrome plated brass ball, full port, teflon seats and stuffing box ring, blow-out proof stem, lever handle, threaded.
C. Valves shall be Ul and AGA listed and shall be listed under ANSI Z 21.15, ASME B 16.33, B 16.38 or B 16.44 as appropriate for pressure size and location.

2.06 FLEXIBLE CONNECTORS

A. Manufacturers:
   1. Circuit Hydraulics, Ltd: www.circuit-hydraulics.co.uk.
   2. Flexicraft Industries: www.flexicraft.com.
   3. Penflex: www.penflex.com.
B. Bronze inner hose and braided exterior sleeve, suitable for minimum 200 psi CWP and 250 degrees F.

2.07 **GAS PRESSURE REGULATORS**

A. Manufacturers:
   1. Maxitrol: www.maxitrol.com
   2. Fisher: www.fisherregulators.com
B. The Contractor shall be responsible to verify the gas pressure provided to the building by the local utility prior to purchasing any regulators.

C. The Contractor shall be responsible to coordinate the exact sizes of all regulators with the pressure and flow rates shown on the Drawings. All regulators shall be sized within the maximum flow rates as indicated by the Manufacturer's written recommendations.
D. All regulators serving single appliances shall be fully rated for the type of application (modulating burner, pilot service, etc.)
E. All regulators serving main gas lines (lines with multiple appliances) shall be rated for this application and shall conform to ANSI Z21.80.
F. Provide vent piping from each regulator conforming to the following:
    1. Vent lines shall be installed full size of the tapping supplied at each regulator. No restrictions shall be allowed.
    2. Each regulator shall be vented independently. No vents from any other device may connect with a regulator vent.
    3. All vents shall terminate with a turned down screened elbow.
    4. Vents may be installed as schedule 40 steel piping or type K copper tubing.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
B. Remove scale and dirt, on inside and outside, before assembly.
C. Prepare piping connections to equipment with flanges or unions.

3.02 PIPING INSTALLATION

A. Install in accordance with manufacturer's instructions and API RP 1615.
B. Route piping in orderly manner and maintain gradient.
C. Group piping whenever practical at common elevations.
D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
E. Provide clearance for installation of insulation and access to valves and fittings.
F. Install firestopping to preserve fire-resistance rating of partitions and other elements.
G. Provide access where valves and fittings are not exposed.
H. Where pipe support members are welded to structural building framing, scrape, brush clean, weld, and apply one coat of zinc rich primer.
I. Prepare pipe, fittings, supports, and accessories not prefinished, ready for finish painting.
J. Identify piping systems, including underground piping. See Section 230553.
K. Install valves with stems upright or horizontal, not inverted.
L. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

3.03 SCHEDULE

A. Above ground piping: Carbon steel piping

END OF SECTION

SECTION 232113 - HYDRONIC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hydronic system requirements.
B. Heating water piping
C. Chilled water piping, above grade.
D. Pipe and pipe fittings for:
    1. Equipment drains and overflows.
E. Pipe hangers and supports.
F. Unions, flanges, mechanical couplings, and dielectric connections.
G. Flow controls.

1.02 RELATED REQUIREMENTS

A. Section 230516 - Expansion Fittings and Loops for HVAC Piping.
B. Section 230523 - General-Duty Valves for HVAC Piping.
C. Section 230548 - Vibration Isolation.
D. Section 230553 - HVAC Identification.
E. Section 230719 - HVAC Piping Insulation.
F. Section 232114 - Hydronic Specialties.
G. Section 232500 - HVAC Water Treatment: Pipe cleaning.
H. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators; 2023.
B. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2021.
C. ASME B16.3 - Malleable Iron Threaded Fittings; The American Society of Mechanical Engineers; 1998 (R2006).
D. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.
E. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.
F. ASME B31.9 - Building Services Piping; 2020.
G. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2001 (R2005).
H. ASME B31.5 - Refrigeration Piping and Heat Transfer Components; The American Society of Mechanical Engineers; 2006.
I. ASME B31.9 - Building Services Piping; The American Society of Mechanical Engineers; 2008 (ANSI/ASME B31.9).
J. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.
K. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2023.
L. ASTM B32 - Standard Specification for Solder Metal; 2020.

M. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2022.
N. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2020.
O. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers; 1992 (Reapproved 2022).
P. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2019.
Q. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2022).

1.04 SUBMITTALS

A. Product Data: Include data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalogue information. Indicate valve data and ratings.
B. Welders Certificate: Include welders certification of compliance with ASME BPVC-IX.
C. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.
D. Project Record Documents: Record actual locations of valves.
E. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.
B. Installer Qualifications: Company specializing in performing work of the type specified in this sectionwith minimum 3 years of experience.
C. Welder Qualifications: Certify in accordance with ASME BPVC-IX.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
B. Provide temporary protective coating on cast iron and steel valves.
C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 HYDRONIC SYSTEM REQUIREMENTS

A. Comply with ASME B31.9 and applicable federal, state, and local regulations.
B. Piping: Provide piping, fittings, hangers, and supports as required, as indicated, and as follows:
    1. Where more than one piping system material is specified, provide joining fittings that are compatible with piping materials and ensure that the integrity of the system is not jeopardized.
    2. Use non-conducting dielectric connections whenever jointing dissimilar metals.
    3. Provide pipe hangers and supports in accordance with ASME B31.9 or MSS SP-58 unless indicated otherwise.
C. Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges or unions to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.
D. Valves: Provide valves where indicated:

1. Provide drain valves where indicated, and if not indicated, provide at least at main shut-off, low points of piping, bases of vertical risers, and at equipment. Use 3/4 inch gate valves with cap; pipe to nearest floor drain.
2. Isolate equipment using butterfly valves with lug end flanges.
3. For throttling, bypass, or manual flow control services, use globe, ball, or butterfly valves.
4. In heating water, chilled water, or condenser water systems, butterfly valves may be used interchangeably with gate and globe valves.
5. For shut-off and to isolate parts of systems or vertical risers, use ball or butterfly valves.

E. Welding Materials and Procedures: Comply with ASME BPVC-IX.

2.02 **HEATING AND COOLING WATER PIPING**

A. Steel Pipe (2" and larger): ASTM A 53/A 53M, Schedule 40, black.
   1. Welded Joints: ASTM A234/A234M, wrought steel welding type fittings; AWS D1.1/D1.1M welded.
   2. Threaded Joints: ASME B16.3, malleable iron fittings.

B. Copper Tube (1.5" and smaller): ASTM B 88 (ASTM B 88M), Type L (B), drawn.
   1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings.
      a. Braze: AWS A5.8M/A5.8 BCuP copper/silver alloy.

2.03 EQUIPMENT DRAINS AND OVERFLOWS

A. Steel Pipe: ASTM A53/A53M, Schedule 40 galvanized; using one of the following joint types:
   1. Threaded Joints: Galvanized cast iron, or ASME B16.3 malleable iron fittings.
   2. Joints: Threaded.

B. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), drawn; using one of the following joint types:
   1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings; ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
   2. Press Fittings: Copper and copper alloy press fittings shall conform to material requirements of ASME B16.18 or ASME B16.22 and performance criteria of IAPMO PS 117. Sealing elements for press fittings shall be EPDM. Sealing elements shall be factory installed.

2.04 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports that comply with MSS SP-58.
   1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.

B. Hangers for Pipe Sizes 1/2 to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.

C. Hangers for Cold Pipe Sizes 2 Inches and Greater: Carbon steel, adjustable, clevis.

D. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.

E. Hangers for Hot Pipe Sizes 6 Inches and Greater: Adjustable steel yoke, cast iron roll, double hanger.

F. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

G. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.

H. Wall Support for Pipe Sizes 4 Inches and Greater: Welded steel bracket and wrought steel clamp.

I. Wall Support for Hot Pipe Sizes 6 Inches and Greater: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
J. Vertical Support: Steel riser clamp.
K. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
L. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
M. Floor Support for Hot Pipe Sizes 6 Inches and Greater: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
N. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
O. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.05 UNIONS, FLANGES, MECHANICAL COUPLINGS, AND DIELECTRIC CONNECTIONS

A. Unions for Pipe of 2 Inches and Less:
   1. Ferrous Piping: 150 psi brass or malleable iron, threaded.
   2. Copper Pipe: Bronze, soldered joints.
B. Flanges for Pipe 2 Inches and Greater:
   1. Ferrous Piping: 150 psig forged steel, slip-on.
   2. Copper Piping: Bronze.
   3. Gaskets: 1/16 inch thick, preformed neoprene.
C. Dielectric Connections:
   1. Waterways:
      a. Water impervious insulation barrier capable of limiting galvanic current to 1 percent of short circuit current in a corresponding bimetallic joint.
      b. Dry insulation barrier able to withstand 600-volt breakdown test.
      c. Construct of galvanized steel with threaded end connections to match connecting piping.
      d. Suitable for the required operating pressures and temperatures.
   2. Flanges:
      a. Dielectric flanges with same pressure ratings as standard flanges.
      b. Water impervious insulation barrier capable of limiting galvanic current to 1 percent of short circuit current in a corresponding bimetallic joint.
      c. Dry insulation barrier able to withstand 600-volt breakdown test.
      d. Construct of galvanized steel with threaded end connections to match connecting piping.
      e. Suitable for the required operating pressures and temperatures.

2.06 FLOW CONTROLS

A. Manufacturers:
   1. Bell & Gossett: www.bellgossett.com
   2. Griswold Controls: www.griswoldcontrols.com
   3. Taco, Inc: www.taco-hvac.com.
B. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.

C. Calibration: Control flow within 10 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, minimum pressure 2 psi.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
B. Remove scale and dirt on inside and outside before assembly.
C. Prepare piping connections to equipment using jointing system specified.
D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.
E. After completion, fill, clean, and treat systems. See Section 232500 for additional requirements.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Install heating water, chilled water, and condenser water piping to ASME B31.9 requirements.
C. Route piping in orderly manner, parallel to building structure, and maintain gradient.
D. Install piping to conserve building space and to avoid interference with use of space.
E. Group piping whenever practical at common elevations.
F. Sleeve pipe passing through partitions, walls, and floors.
G. Slope piping and arrange to drain at low points.
H. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. See Section 230516.
I. Inserts:
    1. Provide inserts for placement in concrete formwork.
    2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
    3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
    4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
    5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
J. Pipe Hangers and Supports:
    1. Install in accordance with ASME B31.9, ASTM F708, or MSS SP-58.
    2. Support horizontal piping as scheduled.
    3. Install hangers to provide minimum 1/2-inch space between finished covering and adjacent work.
    4. Place hangers within 12 inches of each horizontal elbow.
    5. Use hangers with 1-1/2 inches minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
    6. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
    7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

8. Prime coat exposed steel hangers and supports. See Section 09 9123. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

K. Provide access where valves and fittings are not exposed.

L. Use eccentric reducers to maintain top of pipe level.

M. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welds.

N. Prepare unfinished pipe, fittings, supports, and accessories, ready for finish painting. See Section 099123.

O. Install valves with stems upright or horizontal, not inverted.

3.03 SCHEDULES

A. Hanger Spacing for Copper Tubing.
   1. 1/2 Inch and 3/4 inch: Maximum span, 5 feet; minimum rod size, 1/4 inch.
   2. 1 Inch: Maximum span, 6 feet; minimum rod size, 1/4 inch.
   3. 1-1/2 Inches and 2 Inches: Maximum span, 8 feet; minimum rod size, 3/8 inch.
   4. 2-1/2 Inches: Maximum span, 9 feet; minimum rod size, 3/8 inch.

B. Hanger Spacing for Steel Piping.
   1. 1/2 inch, 3/4 inch, and 1 inch: Maximum span, 7 feet; minimum rod size, 1/4 inch
   2. 1-1/4 inches: Maximum span, 8 feet; minimum rod size, 3/8 inch
   3. 1-1/2 inches: Maximum span, 9 feet; minimum rod size, 3/8 inch
   4. 2 inches: Maximum span, 10 feet; minimum rod size, 3/8 inch
   5. 2-1/2 inches: Maximum span, 10 feet; minimum rod size, 3/8 inch
   6. 3 inches: Maximum span, 10 feet; minimum rod size, 3/8 inch
   7. 4 inches: Maximum span, 10 feet; minimum rod size, 1/2 inch
   8. 6 inches: Maximum span, 10 feet; minimum rod size, 1/2 inch.
   9. 8 inches: Maximum span, 10 feet; minimum rod size, 5/8 inch
   10. 10 inches: Maximum span, 10 feet; minimum rod size, 3/4 inch.
   11. 12 inches: Maximum span, 10 feet; minimum rod size, 7/8 inch.

END OF SECTION

SECTION 232114 - HYDRONIC SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air vents.
B. Strainers.
C. Combination fittings.
D. Flow controls.
E. Relief valves.

1.02 RELATED REQUIREMENTS

A. Section 232113 - Hydronic Piping.
B. Section 232500 - HVAC Water Treatment: Pipe cleaning.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS

A. Product Data: Provide product data for manufactured products and assemblies required for this project. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description and model.
B. Certificates: Inspection certificates for pressure vessels from authority having jurisdiction.
C. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.
D. Project Record Documents: Record actual locations of flow controls.
E. Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
B. Provide temporary protective coating on cast iron and steel valves.
C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 AIR VENTS

A. Manufacturers:
   1. Armstrong International: www.armstrongpumps.com.
   2. Bell & Gossett: www.bellgossett.com.

3. Nexus Valve, Inc: www.nexusvalve.com/#sle.
4. Taco, Inc: www.taco-hvac.com.
5. Spirotherm: www.spirotherm.com.

B. Manual Air Vent: Short vertical sections of 2-inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.

C. Float Air Vent:
1. Brass or semi-steel body, copper, polypropylene, or solid non-metallic float, stainless steel valve and valve seat; suitable for system operating temperature and pressure; with isolating valve.
2. Cast iron body and cover, float, bronze pilot valve mechanism suitable for system operating temperature and pressure; with isolating valve.

D. Maximum Fluid Pressure: 150 psi.

E. Maximum Fluid Temperature: 250 degrees F.

2.02 STRAINERS

A. Manufacturers:
1. Armstrong: www.armstrongpumps.com.
2. Grinnell Products, a Tyco Business: www.grinnell.com.
3. Nexus Valve, Inc: www.nexusvalve.com/#sle.
4. Green Country Filtration: greencountryfiltration.com.
5. WEAMCO: www.weamco.com.

B. Size 2 inch and Under:
1. Provide threaded, grooved, or sweat brass or iron body for up to 175 psi working pressure, Y-pattern strainer with 1/32 inch stainless steel perforated screen.

C. Size 2-1/2 inch to 4 inch:
1. Provide flanged or grooved iron body for up to 175 psi working pressure, up to 250 degrees F working temperature, Y-pattern strainer with 1/16 inch or 3/64 inch stainless steel perforated screen.
2. Flanged iron body for 175 psi working pressure, Y pattern with 3/64 inch stainless steel perforated screen.

D. Size 5 inch and Larger:
1. Provide flanged or grooved iron body for up to 175 psi working pressure, basket pattern with 1/8 inch stainless steel perforated screen.
2. Flanged iron body for 175 psi working pressure, basket pattern with 1/8 inch stainless steel perforated screen.

2.03 BALANCING VALVES

A. Manufacturers:
1. Bell & Gossett, a brand of Xylem, Inc: www.bellgossett.com/#sle.
2. Nexus Valve, Inc: www.nexusvalve.com/#sle.

B. Size 2 inch and Smaller:
1. Provide ball or globe style with flow balancing, flow measurement, and shut-off capabilities, memory stops, minimum of two metering ports and NPT threaded or soldered connections.
2. Metal construction materials consist of bronze.
3. Non-metal construction materials consist of Teflon or EPDM.

C. Size 2-1/2 inch and Larger:
   1. Provide ball or butterfly style with flow balancing, flow measurement, and shut-off capabilities, memory stops, minimum of two metering ports and flanged or grooved connections.
   2. Valve body construction materials consist of carbon steel or ductile iron.
   3. Internal components construction materials consist of aluminum bronze, bronze, Teflon, EPDM, or NORYL.

2.04 AUTOMATIC FLOW CONTROL VALVES

A. Manufacturers:
   1. Armstrong International: www.armstronginternational.com
   2. Bell & Gossett, a brand of Xylem, Inc: www.bellgossett.com/#sle.
   3. Nexus Valve, Inc: www.nexusvalve.com/#sle.
   4. Amtrol Inc: www.amtrol.com.
   5. Tour & Anderson: www.touranderson.com.
B. Construction:
   1. Brass, bronze, or iron body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet with blowdown/backflush drain.
   2. Built-in lug-type outlet butterfly valve with 2-position handle.
C. Calibration: Control flow within 10 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, minimum pressure 2 psi.
D. Control Mechanism: Provide stainless steel or nickel-plated, brass piston or regulator cup, operating against stainless steel helical or wave formed spring or elastomeric diaphragm and polyphenylsulfone orifice plate.
E. Accessories: Provide hanging tag, inlet in-line strainer, outlet ball valve, and PT test plug extension.

2.05 COMBINATION PIPING PACKAGES

A. Manufacturers:
   1. Nexus Valve: www.nexusvalve.com
   2. Bell & Gossett: www.bellgossett.com
   3. Tour & Anderson: www.victaulic.com
   4. Flow Design, Inc: www.flowdesign.com
B. In lieu of providing multiple piping devices (isolation valves, unions, flow control, etc.) at each coil, combination piping packages may be used.
C. Combination devices shall include all functions provided by the individual devices shown on the piping diagrams for each piece of equipment.
D. Pressure loss through the combination devices shall be equal to or less than the loss through the individual devices and associated fittings.

2.06 RELIEF VALVES

A. Manufacturers:
   1. Apollo Valves: www.apollovalves.com/#sle.
   2. Armstrong: www.armstrongpumps.com
   3. ITT Bell & Gossett: www.bellgossett.com.
   4. Hoffman Specialty: www.hoffmanspecialty.com

5. Conbraco Industries: www.apollovalves.com.

B. Bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labelled.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install specialties in accordance with manufacturer's instructions.
B. Where large air quantities can accumulate, provide enlarged air collection standpipes.
C. Provide manual air vents at system high points and as indicated.
D. For automatic air vents in ceiling spaces or other concealed locations, provide vent tubing to nearest drain.
E. Provide valved drain and hose connection on strainer blowdown connection.
F. Provide relief valves on pressure tanks, low-pressure side of reducing valves, heat exchangers, and expansion tanks.
G. Select system relief valve capacity so that it is greater than make-up pressure reducing valve capacity. Select equipment relief valve capacity to exceed rating of connected equipment.
H. Pipe relief valve outlet to nearest floor drain.

END OF SECTION

SECTION 232300 - REFRIGERANT PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping.
B. Refrigerant.
C. Moisture and liquid indicators.
D. Valves.
E. Filter-driers.
F. Solenoid valves.
G. Expansion valves.
H. Electronic expansion valves.
I. Flexible connections.
J. Conduit and wiring to support associated devices and controls.

1.02 RELATED REQUIREMENTS

A. Section 230716 - HVAC Equipment Insulation.
B. Section 230719 - HVAC Piping Insulation.
C. Section 230993 - Sequence of Operations for HVAC Controls.
D. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. AHRI 495 - Performance Rating of Refrigerant Liquid Receivers; 2005.
B. AHRI 710 - Performance Rating of Liquid-Line Driers; 2009.
C. AHRI 730 (I-P) - Flow Capacity Rating of Suction Line Filters and Suction Line Filter Driers; 2013 (Reapproved 2014).
D. AHRI 750 - Thermostatic Refrigerant Expansion Valves; 2007.
E. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2019, with All Amendments and Errata.
F. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators; 2023.
G. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.
H. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; 2018.
I. ASME B31.5 - Refrigeration Piping and Heat Transfer Components; 2020.
J. ASME B31.9 - Building Services Piping; 2020.
K. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2022.
L. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2020.
M. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service; 2020.
N. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2019.
O. UL 429 - Electrically Operated Valves; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. Product Data: Provide general assembly of specialties, including manufacturers catalogue information. Provide Manufacturer's catalog data including load capacity.
B. Shop Drawings: Indicate schematic layout of system, including equipment, critical dimensions, and sizes. Drawings shall be submitted to the Architect and to the unit Manufacturer for review prior to installation of any piping or equipment. The Contractor shall be responsible for all Manufacturer required modifications to the piping and equipment shown on the Drawings.
C. Design Data: Submit design data indicating pipe sizing. Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.
D. Test Reports: Indicate results of leak test, acid test.
E. Manufacturer's Installation Instructions: Indicate support, connection requirements, and isolation for servicing.
F. Project Record Documents: Record exact locations of equipment and refrigeration accessories on Record Drawings.
G. Maintenance Data: Include instructions for changing cartridges, assembly views, spare parts lists.

1.05 QUALITY ASSURANCE

A. Installer: Company specializing in performing the type of work specified in this section, with minimum 3 years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store piping and specialties in shipping containers with labeling in place.
B. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installation.
C. Dehydrate and charge components such as piping and receivers, seal prior to shipment, until connected into system.

PART 2 PRODUCTS

2.01 SYSTEM DESCRIPTION

A. Where more than one piping system material is specified ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
B. Provide pipe hangers and supports in accordance with ASME B31.5 unless indicated otherwise.
C. Liquid Indicators:
    1. Use line size liquid indicators in main liquid line leaving condenser.
    2. Use line size on leaving side of liquid solenoid valves.
D. Valves:
    1. Use service valves on suction and discharge of compressors.
    2. Use gauge taps at compressor inlet and outlet.
    3. Use gauge taps at hot gas bypass regulators, inlet and outlet.
E. Refrigerant Charging (Packed Angle) Valve: Use in liquid line between receiver shut-off valve and expansion valve.
F. Pressure Relief Valves: Use on ASME receivers and pipe to outdoors.

G. Filter-Driers:
   1. Use a filter-drier immediately ahead of liquid-line controls, such as thermostatic expansion valves, solenoid valves, and moisture indicators.
H. Solenoid Valves:
   1. Use in liquid line of systems operating with single pump-out or pump-down compressor control.
   2. Use in liquid line of single or multiple evaporator systems.
I. Flexible Connectors: Utilize at or near compressors where piping configuration does not absorb vibration.

2.02 REGULATORY REQUIREMENTS

A. Comply with ASME B31.9 for installation of piping system.
B. Products Requiring Electrical Connection: Listed and classified by UL, as suitable for the purpose indicated.

2.03 PIPING

A. Copper Tube: ASTM B280, Type L (ACR) H58 hard drawn or O60 soft annealed.
   1. Fittings: ASME B16.22 wrought copper.
   2. Joints: Braze, AWS A5.8M/A5.8 BCuP silver/phosphorus/copper alloy.
B. Copper Tube to 7/8 inch OD: ASTM B88 (ASTM B88M), Type K (A), annealed.
   1. Fittings: ASME B16.26 cast copper.
   2. Joints: Flared.
   3. Joints: Braze, AWS A5.8M/A5.8 BCuP silver/phosphorus/copper alloy.
C. Pipe Supports and Anchors:
   1. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron adjustable swivel, split ring.
   2. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
   3. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
   4. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
   5. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
   6. Vertical Support: Steel riser clamp.
   7. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
   8. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
   9. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
   10. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.04 MOISTURE AND LIQUID INDICATORS

A. Manufacturers:
   1. Henry Technologies: www.henrytech.com.
   2. Parker Hannifin/Refrigeration and Air Conditioning: www.parker.com.
   3. Sporlan, a Division of Parker Hannifin: www.parker.com.

B. Indicators: Single port type, UL listed, with copper or brass body, flared or solder ends, sight glass, color coded paper moisture indicator with removable element cartridge and plastic cap; for maximum temperature of 200 degrees F and maximum working pressure of 500 psi.

2.05 VALVES

A. Manufacturers:
   1. Hansen Technologies Corporation: www.hantech.com
   2. Henry Technologies: www.henrytech.com.
   3. Danfoss Automatic Controls: www.danfoss.com
B. Diaphragm Packless Valves:
   1. UL listed, globe or angle pattern, forged brass body and bonnet, phosphor bronze and stainless steel diaphragms, rising stem and handwheel, stainless steel spring, nylon seat disc, soldered or flared ends, with positive backseating; for maximum working pressure of 500 psi and maximum temperature of 275 degrees F.
C. Packed Angle Valves:
   1. Forged brass or nickel plated forged steel, forged brass seal caps with copper gasket, rising stem and seat with backseating, molded stem packing, soldered or flared ends; for maximum working pressure of 500 psi and maximum temperature of 275 degrees F.
D. Ball Valves:
   1. Two piece bolted forged brass body with teflon ball seals and copper tube extensions, brass bonnet and seal cap, chrome plated ball, stem with neoprene ring stem seals; for maximum working pressure of 500 psi and maximum temperature of 300 degrees F.
E. Service Valves:
   1. Forged brass body with copper stubs, brass caps, removable valve core, integral ball check valve, flared or soldered ends, for maximum pressure of 500 psi.

2.06 FILTER-DRIERS

A. Manufacturers:
   1. Emerson Valves: www.emersonclimate.com
   2. Parker Hannifin/Refrigeration and Air Conditioning: www.parker.com.
   3. Sporlan, a Division of Parker Hannifin: www.parker.com.
B. Performance:
   1. Flow Capacity - Liquid Line: System capacity, minimum, rated in accordance with AHRI 710.
   2. Pressure Drop: 2 psi, maximum, when operating at full connected evaporator capacity.
   3. Design Working Pressure: 350 psi, minimum.
C. Cores: Molded or loose-fill molecular sieve desiccant compatible with refrigerant, activated alumina, activated charcoal, and filtration to 40 microns, with secondary filtration to 20 microns; of construction that will not pass into refrigerant lines.
D. Construction: UL listed.
   1. Replaceable Core Type: Steel shell with removable cap.
   2. Sealed Type: Copper shell.
   3. Connections: As specified for applicable pipe type.

2.07 SOLENOID VALVES

A. Manufacturers:

1. Emerson Valves: www.emersonclimate.com
2. Parker Hannifin/Refrigeration and Air Conditioning: www.parker.com.
3. Sporlan, a Division of Parker Hannifin: www.parker.com.

B. Valve: AHRI 760 (I-P) (AHRI 761 (SI)), pilot operated, copper, brass or steel body and internal parts, synthetic seat, stainless steel stem and plunger assembly (permitting manual operation in case of coil failure), integral strainer, with flared, soldered, or threaded ends; for maximum working pressure of 500 psi.

C. Coil Assembly: UL 429 UL listed, replaceable with molded electromagnetic coil, moisture and fungus proof, with surge protector and color coded lead wires, integral junction box with pilot light.

2.08 EXPANSION VALVES

A. Manufacturers:
1. Emerson Valves: www.emersonclimate.com
2. Parker Hannifin/Refrigeration and Air Conditioning: www.parker.com.
3. Sporlan, a Division of Parker Hannifin: www.parker.com.

B. Angle or Straight Through Type: AHRI 750; design suitable for refrigerant, brass body, internal or external equalizer, bleed hole, adjustable superheat setting, replaceable inlet strainer, with nonreplaceable capillary tube and remote sensing bulb and remote bulb well.

C. Selection: Evaluate refrigerant pressure drop through system to determine available pressure drop across valve. Select valve for maximum load at design operating pressure and minimum 10 degrees F superheat. Select to avoid being undersized at full load and excessively oversized at part load.

2.09 ELECTRONIC EXPANSION VALVES

A. Valve:
1. Brass body with flared or soldered connection, needle valve with floating needle and machined seat, stepper motor drive.

B. Evaporation Control System:
1. Electronic microprocessor based unit in enclosed case, proportional integral control with adaptive superheat, maximum operating pressure function, preselection allowance for electrical defrost and hot gas bypass.

C. Refrigeration System Control: Electronic microprocessor based unit in enclosed case, with proportional integral control of valve, on/off thermostat, air temperature alarm (high and low), solenoid valve control, liquid injection adaptive superheat control, maximum operating pressure function, night setback thermostat, timer for defrost control.

2.10 FLEXIBLE CONNECTORS

A. Manufacturers:
1. Circuit Hydraulics, Ltd: www.circuit-hydraulics.co.uk.
2. Flexicraft Industries: www.flexicraft.com.
3. Penflex: www.penflex.com.

B. Corrugated stainless steel hose with single layer of stainless steel exterior braiding, minimum 9 inches long with copper tube ends; for maximum working pressure of 500 psi.

2.11 CONDUIT AND WIRING

A. Power wiring shall be installed within full metallic raceway. Refer to sections 260529, 260553, 260519, 260534, 260535 and 260537 for specific requirements. Provide all wiring, conduit and circuit breakers required for a fully functional installation.
B. Exposed wiring installed in finished areas shall be installed within surface metallic raceways. Refer to section 260535 for specific requirements.
C. Low voltage cabling installed less than 10'-0" above finished floor elevation in mechanical areas shall be installed in metallic raceway. Wiring installed above that elevation may be installed exposed.
D. Low voltage cabling concealed in walls shall be installed in full metallic raceway. Conduit shall terminate above suspended ceilings with conduit bushing.
E. Low voltage cabling concealed by suspended ceilings may be installed exposed above ceiling.
F. All exposed low voltage cabling shall be supported on 4'-0" center to center intervals with Erico Cablecat 2" J Hooks. Install tye-wraps around all J hooks upon completion of cable pulls. Provide all necessary mounting hardware.
G. All new conduit shall be blue True Color conduit. Refer to section 260553 for additional information.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs.
B. Remove scale and dirt on inside and outside before assembly.
C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

A. Install refrigeration specialties in accordance with the Manufacturer's written instructions.
B. Route piping in orderly manner, with piping parallel to building structure, and maintain gradient.
C. Install piping to conserve building space and avoid interference with use of space.
D. Group piping whenever practical at common elevations and locations. Slope piping one percent in direction of oil return.
E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
F. Inserts:
    1. Provide inserts for placement in concrete formwork.
    2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
    3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
    4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
    5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut flush with top of slab.
G. Pipe Hangers and Supports:
    1. Install in accordance with ASME B31.5.

2. Support horizontal piping as indicated.
3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
4. Place hangers within 12 inches of each horizontal elbow.
5. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
7. Provide copper plated hangers and supports for copper piping.

H. Arrange piping to return oil to compressor. Provide traps and loops in piping, and provide double risers as required by the unit Manufacturer. Slope horizontal piping 0.40 percent in direction of flow. Coordinate all installation requirements with the Manufacturer's written recommendations.

I. Provide clearance for installation of insulation and access to valves and fittings.

J. Provide access to concealed valves and fittings. Coordinate size and location of access doors with Section 083100.

K. Flood piping system with nitrogen when brazing.

L. Where pipe support members are welded to structural building frame, brush clean, and apply one coat of zinc rich primer to welding.

M. Prepare unfinished pipe, fittings, supports, and accessories ready for finish painting. See Section 099123.

N. Insulate piping and equipment.

O. Follow ASHRAE Std 15 procedures for charging and purging of systems and for disposal of refrigerant.

P. Provide replaceable cartridge filter-driers, with isolation valves and valved bypass.

Q. Locate expansion valve sensing bulb immediately downstream of evaporator on suction line.

R. Provide external equalizer piping on expansion valves with refrigerant distributor connected to evaporator.

S. Install flexible connectors at right angles to axial movement of compressor, parallel to crankshaft.

T. Fully charge completed system with refrigerant after testing.

3.03 FIELD QUALITY CONTROL

A. Test refrigeration system in accordance with ASME B31.5.

B. Pressure test system with dry nitrogen to 200 psi. Perform final tests at 27 inches vacuum and 200 psi using electronic leak detector. Test to no leakage.

3.04 SCHEDULES

A. Hanger Spacing for Copper Tubing.
1. 1/2 inch, 5/8 inch, and 7/8 inch OD: Maximum span, 5 feet; minimum rod size, 1/4 inch.
2. 1-1/8 inch OD: Maximum span, 6 feet; minimum rod size, 1/4 inch.
3. 1-3/8 inch OD: Maximum span, 7 feet; minimum rod size, 3/8 inch.
4. 1-5/8 inch OD: Maximum span, 8 feet; minimum rod size, 3/8 inch.
5. 2-1/8 inch OD: Maximum span, 8 feet; minimum rod size, 3/8 inch.
6. 2-5/8 inch OD: Maximum span, 9 feet; minimum rod size, 3/8 inch.
7. 3-1/8 inch OD: Maximum span, 10 feet; minimum rod size, 3/8 inch.

8. 3-5/8 inch OD: Maximum span, 10 feet; minimum rod size, 1/2 inch.
9. 4-1/8 inch OD: Maximum span, 10 feet; minimum rod size, 1/2 inch.

END OF SECTION

SECTION 232500 - HVAC WATER TREATMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Materials.
   1. System cleaner.
   2. Closed system treatment (water).
B. Side-stream filtration equipment.

1.02 RELATED REQUIREMENTS

A. Section 232113 - Hydronic Piping.
B. Section 232114 - Hydronic Specialties.
C. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 SUBMITTALS

A. Product Data: Provide chemical treatment materials, chemicals, and equipment including electrical characteristics and connection requirements.
B. Shop Drawings: Indicate system schematic, equipment locations, and controls schematics, electrical characteristics and connection requirements.
C. Manufacturer's Installation Instructions: Indicate placement of equipment in systems, piping configuration, and connection requirements.
D. Manufacturer's Field Reports: Indicate start-up of treatment systems when completed and operating properly. Indicate analysis of system water after cleaning and after treatment.
E. Project Record Documents: Record actual locations of equipment and piping, including sampling points and location of chemical injectors.
F. Operation and Maintenance Data: Include data on chemical feed pumps, agitators, and other equipment including spare parts lists, procedures, and treatment programs. Include step by step instructions on test procedures including target concentrations.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience. Company shall have local representatives with water analysis laboratories and full time service personnel.
B. Provide water treatment equipment systems and chemicals for all water using systems as specified. It shall be the Contractor's responsibility to provide appropriate chemical treatment products and to properly size all components of the equipment system(s). All equipment and systems shall be installed per the Manufacturer's written instructions.

1.05 REGULATORY REQUIREMENTS

A. Conform to applicable Codes for addition of non-potable chemicals to building mechanical systems and to public sewage systems.

1.06 OPERATION AND MAINTENANCE DATA

A. Include data on all equipment, including spare parts lists, and product data and MSDS for all chemical treatments required.
B. Include step by step instructions on testing procedures, including target concentrations.

1.07 REGULATORY REQUIREMENTS

A. Discharge from any treated system shall be directed to sanitary sewers and shall not result in contaminant levels which are in excess of standards set forth by the appropriate water pollution control authority.
B. Provide service and maintenance of the water treatment systems, including chemical treatment products, for control of scale formation, corrosion, and microbiological growth in all treated systems from the date of start-up through the warranty period.
C. Provide monthly technical service visits to perform field inspections and make water analysis on site. Detail findings in writing on proper practices, chemical treating requirements, and corrective actions needed. Submit two copies of field service report to the Architect and Owner after each visit.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. H-O-H Water Technology, Inc.: www.hohwatertechnology.com
B. Nalco, an Ecolab Company: www.nalco.com.
C. Butler Chemical Company: www.butlerchemicalco.com

2.02 MATERIALS

A. System Cleaner:
    1. Liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products; sodiumtripoly phosphate and sodium molybdate.
    2. Biocide chlorine release agents such as sodium hypochlorite or calcium hypochlorite or microbiocides such as quarternary ammonia compounds, tributyltin oxide, methylene bis (thiocyanate).
B. Closed System Treatment (Water):
    1. Sequestering agent to reduce deposits and adjust pH; polyphosphate.
    2. Corrosion inhibitors; boron-nitrite, sodium nitrite and borax, sodium totyltriazole, low molecular weight polymers, phosphonates, sodium molybdate, or sulphites.
    3. Conductivity enhancers; phosphates or phosphonates.

2.03 **BY-PASS (POT) FEEDER**

A. 5.0 gal with quick opening cap for working pressure of 175 psi.

2.04 **SIDE-STREAM FILTRATION SYSTEM**

A. System: Flow indicator, filter housing with cartridge filter, shut-off valves, and flow control valve.
B. Filter Housing: Glass reinforced nylon plastic suitable for 220 degrees F and 200 psi operating conditions.
C. Cartridges: 30 micron for start-up and 5 micron for system operation.

PART 3 EXECUTION

3.01 PREPARATION

A. Systems shall be operational, filled, started, and vented prior to cleaning. Use water meter to record capacity in each system.
B. Place terminal control valves in open position during cleaning.
C. Verify that electric power is available and of the correct characteristics.

3.02 WATER ANALYSIS

A. Perform an analysis of supply water to determine the type of water treatment and quantities of chemical treatment needed to maintain acceptable water quality as specified in "Performance Requirements" Article.

3.03 CONNECTIONS

A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
B. Install piping adjacent to equipment to allow service and maintenance.
C. Confirm applicable electrical requirements in Division 26 for connecting electrical equipment. Power, control and interlock wiring materials and labor to be provided under Division 23 unless noted otherwise.

3.04 FIELD QUALITY CONTROL

A. Engage a factory-authorized service representative to perform startup service.
B. Inspect field-assembled components and equipment installation, including piping. Report results in writing.
C. Inspect piping and equipment to determine that systems and equipment have been cleaned, flushed, and filled with water, and are fully operational before initiating water-treatment system.

3.05 CLEANING SEQUENCE

A. Prior to acceptance by the owner, all grease, dirt, oil and metallic oxides shall be removed from each water system. The Contractor shall coordinate all system materials of construction to insure chemical cleaner compatibility. Supervision and cleaner shall be provided by a factory authorized representative. The following cleaning procedure shall apply:
B. Concentration:
    1. As recommended by the Manufacturer.
C. Closed Recirculating Water Systems
    1. The system shall be filled through a suitable water meter to determine total water volume, taking care to bleed all air.
    2. With the system circulating, flow will be verified throughout the system. All debris shall be flushed from the system and all strainers cleaned.
    3. Cleaner shall be added to the system at a dosage rate as recommended by the Manufacturer. The Contractor shall verify cleaner strength.
    4. Hot water systems shall be heated to 160-180ºF and circulated for twenty-four (24) hours. Chilled water systems shall be circulated for forty-eight (48) hours.

5. During the cleaning period, system water shall be circulated through the entire system. The Contractor shall insure that all small orifices (control valves, strainers, etc.) remain free of debris. A side stream filter shall be used for removal of suspended solids during the cleaning period. Filter Media shall be changed as required.
6. When cleaning period is complete, the system shall be drained and flushed with fresh water to remove the cleaning solution. Flushing shall continue until the total (M) alkalinity of the system water is within fifty (50) ppm of the total alkalinity of the make-up water.
7. All strainers, dead legs, and areas of low flow shall be thoroughly flushed to remove accumulated debris.

D. Use neutralizer agents on recommendation of system cleaner supplier and approval of Engineer.

E. Flush open systems with clean water for one hour minimum. Drain completely and refill.

F. Remove, clean, and replace strainer screens.

G. Inspect, remove sludge, and flush low points with clean water after cleaning process is completed. Include disassembly of components as required.

H. Immediately following completion and verification of flushing, certification records covering the cleaning shall be submitted to the Architect. Records shall include system volume, cleaner concentration, circulation time, and final alkalinity reading. Each system shall be chemically treated as provided elsewhere in this specification.

I. Place water-treatment system into operation during the preliminary phase of systems' startup procedures.

3.06 INSTALLATION

A. Install in accordance with the Manufacturer's instructions.

B. Install water treatment equipment level and plumb. Maintain manufacturers recommended clearances. Arrange units so that controls and devices requiring servicing are accessible.

3.07 CLOSED SYSTEM TREATMENT

A. Provide and install equipment for manual addition of chemical treatment and removal of suspended solids for each closed recirculating water system. Equipment shall consist of the following components:
1. By-Pass Feeder shall be five (5) gallon capacity, steel construction with maximum operating pressure of 300 psi at 200ºF. By-pass feeder shall have 4" wide opening with cast iron, course thread, quick opening top closure, demountable leg extensions, and ¾" NPT inlet, outlet and drain fittings. By-pass feeder shall be installed across the common discharge and suction piping of the recirculating pumps. By-pass feeder shall be Neptune Model DBF-5HP.
2. Cartridge Filter Vessel shall be 304 stainless steel construction with maximum operating pressure of 150 psi at 250ºF. Filter vessel shall be split shell construction with NPT inlet, outlet, bottom drain, and top vent fittings. Filter vessel shall be installed across the common discharge and suction piping of the recirculating pumps and shall be sized to filter the equivalent of the system water volume once every four (4) hours. Filter Vessel shall be as manufactured by Cuno or Flowmatic.
3. Filter cartridges shall be wound polypropylene media with a tin core, ten (10) micron rating, and a maximum temperature of 200º F sized to properly fit the filter vessel. Filter cartridges shall be furnished in a quantity sufficient for six (6) complete changes of the filter vessel. Filter cartridges shall be changed when the pressure drop across the filter vessel exceeds 20 psi, or as recommended by the water treatment contractor.

3.08 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain water-treatment systems and equipment.
B. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment and schedules.
C. Review data in maintenance manuals, especially data on recommended parts inventory and supply sources and on availability of parts and service.
D. Schedule training with the Owner, through the Architect, with at least seven days' advance notice.

3.09 CLOSEOUT ACTIVITIES

A. Training: Train Owner's personnel on operation and maintenance of chemical treatment system.
    1. Provide minimum of two hours of instruction for two people.
    2. Have operation and maintenance data prepared and available for review during training.
    3. Conduct training using actual equipment after treated system has been put into full operation.

3.10 MAINTENANCE

A. Perform maintenance work using competent and qualified personnel under the supervision and in the direct employ of the equipment manufacturer or original installer.
B. Provide service and maintenance of treatment systems for one year from Date of Substantial Completion.
C. Provide monthly technical service visits to perform field inspections and make water analysis on-site. Detail findings in writing on proper practices, chemical treating requirements, and corrective actions needed. Submit two copies of field service report after each visit.
D. Provide laboratory and technical assistance services during this maintenance period.
E. Provide on-site inspections of equipment during scheduled or emergency shutdown to properly evaluate success of water treatment program, and make recommendations in writing based upon these inspections.

END OF SECTION

SECTION 233100 - HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal ducts.
B. Flexible ducts.
C. Galvanized steel ductwork

1.02 RELATED REQUIREMENTS

A. Section 230130.51 - HVAC Air-Distribution System Cleaning: Post install duct cleaning.
B. Section 230713 - Duct Insulation: External insulation and duct liner.
C. Section 233300 - Air Duct Accessories.
D. Section 233319 - Duct Silencers.
E. Section 233700 - Air Outlets and Inlets: Fabric air distribution devices.

1.03 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
D. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2015.
E. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2015.
F. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2015.
G. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2021.
H. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2021.
I. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2021.
J. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.
K. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; current edition, including all revisions.
L. No variation of duct configuration or sizes is permitted except by prior written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

1.04 SUBMITTALS

A. Product Data: Provide data for duct materials.
B. Shop Drawings: Indicate duct fittings, particulars such as gauges, sizes, welds, and configuration prior to start of work for all systems.
C. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual.
D. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience, and approved by manufacturer.
B. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum 5 years of documented experience.

1.06 FIELD CONDITIONS

A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Provide UL Class 1 ductwork, fittings, hangers, supports, and appurtenances in accordance with NFPA 90A and SMACNA (DCS) guidelines unless stated otherwise.
B. Acoustical Treatment: Provide sound-absorbing liners and sectional silencers for metal-based ducts in compliance with Section 233319.
C. Duct Sealing and Leakage in accordance with Static Pressure Class:
    1. Low Pressure Service: Up to 2 in-wc:
        a. Seal: Class C, apply to seal off transverse joints.
        b. Leakage:
            1) Rectangular: Class 24 or 24 cfm/100 sq ft.
            2) Round: Class 12 or 12 cfm/100 sq ft.
    2. Low Pressure Service: From 2 in-wc to 3 in-wc:
        a. Seal: Class B, apply sealing of transverse joints and longitudinal seams.
        b. Leakage:
            1) Rectangular: Class 12 or 12 cfm/100 sq ft.
            2) Round: Class 6 or 6 cfm/100 sq ft.
    3. Medium and High Pressure Service: Above 3 in-wc:
        a. Seal: Class A, apply sealing of transverse joints, longitudinal seams, and duct wall penetrations.
        b. Leakage:
            1) Rectangular: Class 6 or 6 cfm/100 sq ft.
            2) Round: Class 3 or 3 cfm/100 sq ft.
D. Duct Fabrication Requirements:
    1. Duct and Fitting Fabrication and Support: SMACNA (DCS) including specifics for continuously welded round and oval duct fittings.
    2. Use reinforced and sealed sheet-metal materials at recommended gauges for indicated operating pressures or pressure class.
    3. Construct tee's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide air foil turning vanes of perforated metal with glass fiber insulation.

4. Provide turning vanes of perforated metal with glass fiber insulation when acoustical lining is indicated.
5. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
6. Provide turning vanes of perforated metal with glass fiber insulation when an acoustical lining is required.
7. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

2.02 METAL DUCTS

A. Material Requirements:
   1. Galvanized Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
B. Round Metal Ducts:
   1. Round Single Wall Duct: Round lock seam duct with galvanized steel outer wall.
      a. Manufacturers:
         1) Linx Industries, Inc, a DMI Company: www.li-hvac.com/#sle.
   2. Round Connection System: Interlocking duct connection system per SMACNA (DCS).
C. Round Spiral Duct:
   1. Round spiral lock seam duct with galvanized steel outer wall.
D. Connectors, Fittings, Sealants, and Miscellaneous:
   1. Fittings: Manufacture with solid inner wall of perforated galvanized steel.
   2. Transverse Duct Connection System: SMACNA "E" rated rigid class connection, interlocking angle and duct edge connection system with sealant, gasket, cleats, and corner clips in accordance with SMACNA (DCS).
   3. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
      a. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
      b. VOC Content: Not more than 250 g/L, excluding water.
      c. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.
      d. For Use with Flexible Ducts: UL labeled.
   4. Gasket Tape:
      a. Provide butyl rubber gasket tape for a flexible seal between transfer duct connector (TDC), transverse duct flange (TDF), applied flange connections, and angle ring connections.
   5. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.
   6. Hanger Fasteners: Attach hangers to structure using appropriate fasteners as follows:
      a. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
      b. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
      c. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
      d. Masonry Screw Type Anchors: Complying with ICC-ES AC106.

e. Other Types: As required.

E. Flexible Ducts: UL 181, Class 1, polyethylene film, mechanically fastened and rolled using galvanized steel to form a spiral helix.
   1. Insulation: R6 insulation with polyethylene vapor barrier film.
   2. Pressure Rating: 10 in-wc positive and 5 in-wc negative.
   3. Maximum Velocity: 5500 fpm.
   4. Temperature Range: Minus 20 degrees F to 250 degrees F.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install, support, and seal ducts in accordance with SMACNA (DCS).
B. Install in accordance with the manufacturer's written instructions.
C. Comply with safety standards NFPA 90A and NFPA 90B.
D. During construction, provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering the ductwork system.
E. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
F. Flexible Ducts: Connect to metal ducts with adhesive.
G. Duct sizes indicated are inside clear dimensions.
H. Seal all longitudinal and transverse joints, seams and connections of all supply, return and exhaust ductwork with welds, gaskets, mastics(adhesives), mastics plus embeded fabric systems or tapes installed in accordance with the manufacturer's installation instructions. Duct sealing shall meet all SMACNA requirements for the pressure clasification of the duct systems as well as the 2015 International Energy Conservation Code.
I. Provide openings in ductwork as indicated to accommodate thermometers and controllers. Provide pilot tube openings as indicated for testing of systems, complete with metal can with spring device or screw to insure against air leakage. For openings, insulate ductwork and install insulation material inside a metal ring.
J. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
K. All rectangular ductwork shall be installed with the top of the duct tight to the bottom of structure. All transitions shall be made flat on bottom to maintain top of duct elevation relative to structure. Where ducts cross obstructions lower than the surrounding structure, transition duct to be low obstruction and back up tight to structure on both sides of obstruction.
L. All concealed round ductwork shall be installed with the bottom of duct above the bottom of the surrounding structure.
M. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with a crimp in the direction of airflow.
N. Use double nuts and lock washers on threaded rod supports.
O. Connect terminal units to supply ducts directly or with one foot maximum length of flexible duct. Do not use a flexible duct to change direction.
P. Connect diffusers or light troffer boots to low pressure ducts directly or with 3 feet maximum length of flexible duct held in place with strap or clamp.
Q. Fire Partitions: Provide firestopping sealing as indicated within Section 078400.
R. Duct Insulation: Provide duct insulation in compliance with Section 230713.

3.02 CLEANING

A. Clean thoroughly each duct system as indicated within Section 230130.51.
B. Clean the duct system and force air at high velocity through the duct to remove accumulated dust. Clean half the system at a time to obtain sufficient air. Protect equipment that could be harmed by excessive dirt with temporary filters or bypass during cleaning.

3.03 SCHEDULES

A. Ductwork Material:
    1. Supply: Galvanized Steel.
    2. Return and Relief: Galvanized Steel.
    3. General Exhaust: Galvanized Steel.

END OF SECTION

SECTION 233300 - AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air turning devices/extractors.
B. Backdraft dampers - metal.
C. Duct access doors.
D. Duct test holes.
E. Fire dampers.
F. Flexible duct connectors.
G. Volume control dampers.
H. Miscellaneous products:
    1. Duct opening closure film.

1.02 RELATED REQUIREMENTS

A. Section 233100 - HVAC Ducts and Casings.
B. Section 233600 - Air Terminal Units: Pressure regulating damper assemblies.
C. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2021.
B. NFPA 92A - Standard for Smoke-Control Systems Utilizing Barriers and Pressure Differences; 2012.
C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.
D. UL 33 - Safety Heat Responsive Links for Fire-Protection Service; Current Edition, Including All Revisions.
E. UL 555 - Standard for Fire Dampers; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.
B. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers.
C. Manufacturer's Installation Instructions: Provide instructions for fire dampers.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.01 AIR TURNING DEVICES/EXTRACTORS

A. Manufacturers:
   1. Krueger: www.krueger-hvac.com.
   2. Ruskin Company: www.ruskin.com/#sle.
   3. Titus: www.titus-hvac.com.
B. Multi-blade device with radius blades attached to pivoting frame and bracket, steel construction, with push-pull operator strap.

2.02 BACKDRAFT DAMPERS - METAL

A. Manufacturers:
   1. Louvers & Dampers, Inc: www.louvers-dampers.com.
   2. Nailor Industries Inc: www.nailor.com.
   3. Ruskin Company: www.ruskin.com.
B. Multi-Blade, Parallel Action Gravity Balanced Backdraft Dampers: Galvanized steel, with center pivoted blades of maximum 6 inch width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.

2.03 DUCT ACCESS DOORS

A. Manufacturers:
   1. Nailor Industries Inc: www.nailor.com.
   2. Ruskin Company: www.ruskin.com.
   3. SEMCO Incorporated: www.semcohvac.com.
B. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ducts, install minimum 1 inch thick insulation with sheet metal cover.
   1. Less Than 12 inches Square: Secure with sash locks.
   2. Up to 18 inches Square: Provide two hinges and two sash locks.
   3. Up to 24 by 48 inches: Three hinges and two compression latches with outside and inside handles.
   4. Larger Sizes: Provide an additional hinge.
C. Access doors with sheet metal screw fasteners are not acceptable.

2.04 DUCT TEST HOLES

A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

2.05 FIRE DAMPERS

A. Manufacturers:
   1. Nailor Industries Inc: www.nailor.com.
   2. Pottorff: www.pottorff.com.
   3. Air Balance, Inc.: www.airbalance.com.
   4. Ruskin Company: www.ruskin.com.

5. Prefco: www.prefco-hvac.com
6. Arrow United Industries: www.arrowunited.com

B. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.

C. Curtain Type Dampers: Galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations. Configure with blades out of air stream for all applications.

D. Multiple Blade Dampers: 16 gage galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, 1/8 x 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock. Dampers shall be U.L. listed for use in a dynamic or static system with U.L. velocities up to 2000 fpm and pressures up to 4 inch w.g. Damper sizes shall be limited as set by manufacturers U.L. listing. Fire dampers shall be installed compelte with sleeves and mounting angles in accordance with U.L. 555 and manufacturer's instructions.

E. Fusible Links: UL 33, separate at 160 degrees F with adjustable link straps for combination fire/balancing dampers.

F. All dampers shall be rated for use in dynamic systems unless noted otherwise.

2.06 FLEXIBLE DUCT CONNECTORS

A. Fabricate in accordance with SMACNA (DCS) and as indicated.

B. Flexible Duct Connections: Fabric crimped into metal edging strip.
1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz/sq yd.
a. Net Fabric Width: Approximately 2 inches wide.
2. Metal: 3 inches wide, 24 gauge, 0.0239 inch thick galvanized steel.

2.07 VOLUME CONTROL DAMPERS

A. Manufacturers:
1. Louvers & Dampers, Inc: www.louvers-dampers.com.
2. Nailor Industries Inc: www.nailor.com.
3. Ruskin Company: www.ruskin.com.

B. Fabricate in accordance with SMACNA (DCS) and as indicated.

C. Splitter Dampers:
1. Material: Same gauge as duct to 24 inches size in either direction, and two gauges heavier for sizes over 24 inches.
2. Blade: Fabricate of single thickness sheet metal to streamline shape, secured with continuous hinge or rod.
3. Operator: Minimum 1/4 inch diameter rod in self aligning, universal joint action, flanged bushing with set screw.

D. Quadrants:
1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.

2.08 MISCELLANEOUS PRODUCTS

A. Duct Opening Closure Film: Mold-resistant, self-adhesive film to keep debris out of ducts during construction.

1. Thickness: 2 mils.
2. High tack water based adhesive.
3. UV stable light blue color.
4. Elongation Before Break: 325 percent, minimum.

PART 3 EXECUTION

3.01 PREPARATION

A. Verify that electric power is available and of the correct characteristics.

3.02 INSTALLATION

A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). See Section 233100 for duct construction and pressure class.
B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
C. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Provide minimum 8 x 8 inch size for hand access, size for shoulder access, and as indicated. Provide 4 x 4 inch for balancing dampers only. Review locations prior to fabrication.
D. Provide duct test holes where indicated and required for testing and balancing purposes.
E. Provide fire dampers at all indicated locations and at all duct and transfer opening penetrations through rated wall, floor and ceiling construction. The Contractor shall be responsible to refer to all Drawings included as part of this Project. Fire dampers shall be provided at all rated construction shown on either the Mechanical or Architectural drawings whether or not the fire ratings or dampers are shown on the Mechanical Drawings.
F. Install all fire dampers in accordance with UL 555. Provide all required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
G. Demonstrate re-setting of fire dampers to the Owner's representative.
H. All fire dampers installed or affected by this Project must be tested and inspected by individuals certified by the International Certifications Board and accredited by the American National Institute in HVAC fire life safety of another nationally recognized certifying body accredited to ISO/IEC 17024 in HVAC fire life safety. Provide full report after inspection and testing.
I. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.
J. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.
K. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.
L. Use splitter dampers only where indicated.
M. Provide balancing dampers on high velocity systems where indicated. See Section 233600 - Air Terminal Units.
N. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

END OF SECTION

SECTION 233700 - AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Diffusers.
B. Rectangular ceiling diffusers.
C. Registers/grilles.

1.02 REFERENCE STANDARDS

A. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2015.
B. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Inlets; 2006 (Reaffirmed 2021).
C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

1.03 SUBMITTALS

A. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.
B. Project Record Documents: Record actual locations of air outlets and inlets.

1.04 QUALITY ASSURANCE

A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Carnes, a division of Carnes Company Inc: www.carnes.com/#sle.
B. Krueger: www.krueger-hvac.com.
C. Metalaire, a brand of Metal Industries Inc: www.metalaire.com/#sle.
D. Price Industries: www.price-hvac.com.
E. Ruskin Company: www.ruskin.com/#sle.
F. Titus: www.titus-hvac.com.
G. Tuttle and Bailey: www.tuttleandbailey.com/#sle.
H. Metalaire
I. Nailor Industries, Inc.: www.nailor.com

2.02 RECTANGULAR CEILING DIFFUSERS

A. Type: Provide square, adjustable pattern,stamped, multi-core diffuser to discharge air in 360 degree pattern with sectorizing baffles where indicated
B. Connections: Round.
C. Frame: Provide inverted T-bar type.In plaster ceilings, provide plaster frame and ceiling frame.
D. Fabrication: Steel with baked enamel finish.
E. Color: As selected by Engineer from manufacturer's standard range.
F. Accessories: Provide radial opposed blade and butterfly volume control damper; removable core and sectorizing baffle with damper adjustable from diffuser face.

2.03 CEILING SUPPLY REGISTERS/GRILLES

A. Type: Streamlined and individually adjustable curved blades to discharge air along face of grille, one-way deflection.
B. Frame: 1-1/4 inch margin with countersunk screw mounting and gasket, unless noted otherwise.
C. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

2.04 CEILING EXHAUST AND RETURN REGISTERS/GRILLES

A. Type: Streamlined blades, 3/4 inch minimum depth, 3/4 inch maximum spacing, with blades set at 45 degrees, vertical face.
B. Frame: 1-1/4 inch margin with countersunk screw mounting, unless noted otherwise.
C. Fabrication: Steel with 20 gauge, 0.0359 inch minimum frames and 22 gauge, 0.0299 inch minimum blades, steel and aluminum with 20 gauge, 0.0359 inch minimum frame, or aluminum extrusions, with factory baked enamel finish.
D. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face where not individually connected to exhaust fans.

2.05 WALL SUPPLY REGISTERS/GRILLES

A. Type: Streamlined and individually adjustable blades, 3/4 inch minimum depth, 3/4 inch maximum spacing with spring or other device to set blades, vertical face, single deflection.
B. Frame: 1-1/4 inch margin with countersunk screw mounting and gasket.
C. Fabrication: Steel with 20 gauge, 0.0359 inch minimum frames and 22 gauge, 0.0299 inch minimum blades, steel and aluminum with 20 gauge, 0.0359 inch minimum frame, or aluminum extrusions, with factory baked enamel finish.
D. Damper: Integral, gang-operated opposed blade type with removable key operator, operable from face.

2.06 WALL EXHAUST AND RETURN REGISTERS/GRILLES

A. Type: Streamlined blades, 3/4 inch minimum depth, 3/4 inch maximum spacing, with spring or other device to set blades, vertical face.
B. Frame: 1-1/4 inch margin with countersunk screw mounting.
C. Fabrication: Steel frames and blades, with factory baked enamel finish.
D. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with the Manufacturer's instructions.
B. Check location of outlets and inlets and make necessary adjustments in position to comply with architectural features, symmetry, and lighting arrangement.
C. Install diffusers to ductwork with air tight connection.
D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.

E. Paint ductwork visible behind air outlets and inlets matte black.

END OF SECTION

SECTION 235100 - BREECHINGS, CHIMNEYS, AND STACKS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Double wall, insulated, pressure rated boiler stacks for condensing flue gasses

1.02 RELATED REQUIREMENTS

A. Section 230716 - HVAC Equipment Insulation.

1.03 REFERENCE STANDARDS

A. ANSI Z21.66 - American National Standard for Automatic Damper Devices for Use with Gas-Fired Appliances; 2015 (Reaffirmed 2020).
B. ANSI Z223.1 - National Fuel Gas Code; 2021.
C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2010.
D. NFPA 54 - National Fuel Gas Code; 2021.
E. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

1.04 SUBMITTALS

A. Product Data: Provide data indicating factory built chimneys, including dimensional details of components and flue caps, dimensions and weights, electrical characteristics and connection requirements.
B. Shop Drawings: Indicate general construction, dimensions, weights, support and layout of breechings. Submit layout drawings indicating plan view and elevations where factory built units are used.
C. Manufacturer's Instructions: Include installation instructions, and indicate assembly, support details, and connection requirements.
D. Manufacturer's Certificate: Certify that refractory lined metal stacks meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
B. Installer Qualifications: Company specializing in performing the type of work specified in this section with minimum 5 years documented experience, and approved by manufacturer.

PART 2 PRODUCTS

2.01 BREECHINGS, CHIMNEYS, AND STACKS - GENERAL REQUIREMENTS

A. Regulatory Requirements:
   1. Comply with applicable codes for installation of natural gas burning appliances and equipment.

2.02 DOUBLE WALL INSULATED PRESSURE RATED STACKS FOR CONDENSING FLUE GASSES

A. Manufacturers
   1. The Schebler Co
B. Provide double wall pressure rated insulated metal stacks for use with category II, III and IV natural gas appliances. Stacks shall comply with UL 1738.
C. Inner jacket shall be entirety constructed of 316 stainless steel. Outer jacket shall consist of type 430 stainless steel. Provide 0.16" insulating air space between jackets.
D. Stacks shall be fully rated for service at 3" wc positive pressure.
E. Accessories, UL labeled:
   1. Roof jack support system with storm collar.
   2. Adjustable length sections.
   3. Vertical termination kit.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Install in accordance with NFPA 54.
C. Install breechings with minimum of joints. Align accurately at connections, with internal surfaces smooth.
D. Support breechings from building structure, rigidly with suitable ties, braces, hangers and anchors to hold to shape and prevent buckling. Support vertical breechings, chimneys, and stacks at 12 foot spacing, to adjacent structural surfaces, or at floor penetrations. Refer to SMACNA (DCS) for equivalent duct support configuration and size.
E. Install concrete inserts for support of breechings, chimneys, and stacks in coordination with formwork.
F. Pitch breechings with positive slope up from fuel-fired equipment to chimney or stack.
G. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified.
H. Install vent dampers, locating close to draft hood collar, and secured to breeching.
I. Assemble and install stack sections in accordance with NFPA 82, industry practices, and in compliance with UL listing. Join sections with acid-resistant joint cement. Connect base section to foundation using anchor lugs.
J. Level and plumb chimney and stacks.
K. Clean breechings, chimneys, and stacks during installation, removing dust and debris.
L. At appliances, provide slip joints permitting removal of appliances without removal or dismantling of breechings, breeching insulation, chimneys, or stacks.
M. Provide maximum 2 feet of breeching to connect appliance to chimney.
N. Positive pressure insulated double wall stacks for condensing flue gasses
   1. Install in accordance with the Manufacturer's written recommendations.

END OF SECTION

SECTION 235216 - CONDENSING BOILERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Manufactured units.
B. Boiler construction.
C. Boiler trim.
D. Fuel burning system.
E. Factory installed controls.

1.02 RELATED REQUIREMENTS

A. Section 230913 - Instrumentation and Control Devices for HVAC.
B. Section 232114 - Hydronic Specialties.
C. Section 232123 - Hydronic Pumps.
D. Section 232500 - HVAC Water Treatment.
E. Section 235100 - Breechings, Chimneys, and Stacks.
F. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. AHRI Directory of Certified Product Performance - Air-Conditioning, Heating, and Refrigeration Institute (AHRI); Current Edition.
B. AHRI 1500 (I-P) - Performance Rating of Commercial Space Heating Boilers; 2024.
C. ANSI Z21.13 - American National Standard for Gas-Fired Low Pressure Steam and Hot Water Boilers; 2017, with Errata (2018).
D. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
E. ASHRAE Std 103 - Methods of Testing for Annual Fuel Utilization Efficiency of Residential Central Furnaces and Boilers; 2022.
F. ASME BPVC-IV - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers; 2023.
G. NBBI Manufacturer and Repair Directory - The National Board of Boiler and Pressure Vessel Inspectors (NBBI); Current Edition.
H. NFPA 54 - National Fuel Gas Code; 2021.

1.04 SUBMITTALS

A. Product Data: Provide data indicating general assembly, components, controls, safety controls, and wiring diagrams with electrical characteristics and connection requirements, and service connections.
B. Manufacturer's Installation Instructions: Indicate assembly, support details, connection requirements, and include start up instructions.
C. Manufacturer's Factory Inspection Report: Submit boiler inspection prior to shipment.
D. Manufacturer's Field Reports: Burner manifold gas pressure, percent carbon monoxide (CO), percent oxygen (O), percent excess air, flue gas temperature at outlet, ambient temperature, net stack temperature, percent stack loss, percent combustion efficiency, and heat output.

1. Indicate compliance with specified performance and efficiency.
2. Provide results of the following combustion tests:
    a. Boiler firing rate.
    b. Gas flow rate.
    c. Burner manifold gas pressure.
    d. Percent carbon monoxide.
    e. Percent oxygen.
    f. Percent excess air.
    g. Flue gas temperature at outlet.
    h. Ambient temperature.
    i. Net stack temperature.
    j. Percent combustion efficiency.
    k. Heat output.

E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, cleaning procedures, replacement parts list, and maintenance and repair data.

F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

G. Software: Copy of software provided under this section.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect boilers from damage by leaving factory inspection openings and shipping packaging in place until final installation.

1.07 WARRANTY

A. Provide a five year warranty to include coverage for heat exchanger.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Natural Gas, Propane, or Combination Natural Gas/Propane for Indoor Applications:
    1. The Fulton Companies: www.fulton.com.

2.02 MANUFACTURED UNITS

A. Factory assembled, factory fire-tested, self-contained, readily transported unit ready for automatic operation except for connection of water, fuel, electrical, and vent services.

B. Unit: Metal membrane wall, water or fire tube, condensing boiler on integral structural steel frame base with integral fuel burning system, firing controls, boiler trim, insulation, and removable jacket, suitable for indoor application.

2.03 BOILER CONSTRUCTION

A. Comply with the minimum requirements of ASME BPVC-IV and ANSI Z21.13 for construction of boilers.

B. The firetube area of the heat exchanger where the flue gases will condense shall be constructed using duplex alloys of stainless steel. Alloys of the 300 series stainless steels, such as 316L or 304, have a relatively high coefficient of linear expansion and thus are unacceptable.
C. Heat exchange capability shall be maximized within the pressure vessel via the use of corrulator fire tube technology. All heat transfer enhancements shall be stainless steel; aluminum heat transfer enhancers are unacceptable.
D. Provide adequate tappings, observation ports, removable panels, and access doors for entry, cleaning, and inspection.
E. Insulate casing with insulation material, protected and covered by heavy-gauge metal jacket.
F. Factory apply boiler base and other components, that are subject to corrosion, with durable, acrylic, powder coated, painted, or weather-proofed finish.
G. External convection and radiation heat losses to the boiler room from the boiler shall be less than 0.5% of the rated boiler input.
H. The boiler shall have its efficiency witnessed and certified by an independent third party, and the efficiency must be listed on the AHRI directory (www.ahridirectory.org) for natural gas operation. The test parameters for efficiency certification shall be the BTS-2000 standard, with 80F return water temperature, 180F supply water temperature, steady state operation at full input firing capacity. The certified thermal efficiency for natural gas firing shall not be less than 93.5%.
I. The boiler shall have no minimum return water temperature requirements.
J. A zero flow or low flow condition shall not cause any harm to the pressure vessel or heat exchanger of the boiler. Flow switches, dedicated circulator pumps, or primary/secondary piping arrangements are not required to protect the heat exchanger or pressure vessel from thermal shock or other system related considerations.
K. The exhaust manifold shall be constructed of stainless steel, with a collection area for the ultimate disposal of flue gas condensate.

2.04 BOILER TRIM

A. The boiler shall be supplied with an ASME Section IV safety relief valve. The safety relief valve size shall be in accordance with ASME code requirements.
B. Flow switch.
C. Electronic Low Water Cut-off: Complete with test light and manual reset button to automatically prevent firing operation whenever boiler water falls below safe level.
D. Temperature and pressure gauge.
E. Pressure Switches:
    1. High gas pressure.
    2. Low gas pressure.
    3. Air pressure.
F. Manual reset high limit.
G. A condensate drain connection shall be available on the boiler, allowing flue gas condensate to freely drain out of the exhaust manifold of the boiler. A Fulton condensate drain trap assembly shall accompany the boiler system, with pH neutralization accommodations available upon request.
H. The water supply and return connections on the boiler shall be 150# flanged connections. The water connections shall not be designed to support any external structural load from the piping system.
I. The boiler shall be complete with lifting eyes and fork truck accessibility for rigging.

J. Instructions for installation, operation and maintenance of the boiler shall be contained in a manual provided with each boiler.

K. A wiring diagram corresponding to the boiler configuration shall be included with each boiler.

2.05 **FUEL BURNING SYSTEM**

A. Provide forced draft automatic burner, integral to boiler, designed to burn natural gas, and maintain fuel-air ratios automatically.
   1. Blower Design: Statically and dynamically balanced to supply combustion air; direct connected to motor.
   2. Forced Draft Design: Mixes combustion air and gas to achieve 90 percent combustion efficiency.
   3. Combustion Air Filter: Protects fuel burning system from debris.

B. Gas Train: Plug valve, safety gas valve, gas-air ratio control valve, and pressure regulator controls air and gas mixture. The gas train shall be fully assembled, wired, and installed on the boiler and shall comply with CSD-1 code. The fuel train components shall be enclosed within the boiler cabinet.

C. A lock up regulator (upstream of the fuel train) shall be furnished as standard within the boiler cabinet.

D. Emission of Oxides of Nitrogen Requirements: Comply with SCAQMD 1146.1 for natural gas fired system, as applicable.

E. Intakes: Combustion air intake capable of accepting direct outside air through a sealed intake pipe.

F. The boiler shall have a pre-mix combustion system, capable of operating at 4”wc incoming gas pressure while simultaneously achieving emissions performance, full modulation/turndown, and full rated input capacity.

G. The burner shall include an internal vortex shredding device to remove harmonics.

H. The burner shall feature direct spark ignition.

2.06 FACTORY INSTALLED CONTROLS

A. Ignition shall be via direct spark. A UV scanner shall be utilized to ensure precise communication of flame status back to the flame programmer.

B. The boiler shall be set up for a maximum 5:1 turndown when firing on natural gas.

C. The boiler shall operate at no greater O2% than 7.0% over a 5:1 turndown range in order to maximize seasonal efficiency. The boiler shall also maintain <20ppm NOx at all operating conditions at excess air no greater than 35% with 5:1 turndown.

D. For an individual boiler, the boiler’s control shall provide boiler status, configuration, history and diagnostics:
   1. Flame programming/flame safeguard control
   2. Temperature (PID) load control capability for up to two loops (central heat and/or domestic hot water).
   3. Color touch screen display with screen saver, screen disable for cleaning, contrast control and volume control for alarm features.
   4. BacNet communication capabilities.
   5. Firing rate limiting.
   6. Time of day display.
   7. Enable/disable control of up to three (3) devices (pumps, valves, etc.) with programmable time delay for disable of the device(s).

8. Customizable boiler name display.
9. Display fifteen (15) most recent alarms including equipment status at time of lockout.
10. Ability to accept a remote 4-20mA signal for setpoint or firing rate.
11. Password protect options.
12. Outdoor reset capabilities for an individual boiler with warm weather shutdown.

E. Each individual boiler shall be able to set up appropriately with programmable limits for (information displayed on the boiler display):
1. Outlet water temperature.
2. Exhaust/stack temperature.
3. Inlet water temperature.
4. Outdoor/ambient air temperature.

F. The boiler control panel can be optionally configured to perform integrated sequencing (lead/lag) functions for up to eight (8) boilers installed in the same hydronic loop. This is done integral to the control thus does not require a third party panel.
1. One (1) boiler in the system must be factory programmed as the master and subsequent boilers will be programmed as lag units. If at any point the master boiler is taken out of the hydronic system, lag boilers will default to local control. One of the lag boilers will need to be reprogrammed in order to resume sequencing functionality in the system.
2. The boilers will communicate with each other via a ModBus network (twisted pair, daisy chain).
3. One BacNet gateway shall be included on the master boiler. The building management system will communicate only to the master boiler with the BacNet protocol.

G. Outdoor reset controls for multiple boiler systems shall include the following:
1. The following sensors shall be provided:
a. Outdoor air/ambient temperature sensor and module shipped loose (must be installed in the field and wired to the master boiler).
b. Hydronic loop temperature sensor and well shipped loose (must be installed in the field and wired to the master boiler).
2. The master boiler shall be field programmed with the desired outdoor reset schedule.
3. The master boiler shall have the ability to disable the entire hydronic boiler system based on a programmable outdoor air temperature (warm weather shutdown).

H. Sequencing logic of multiple boilers using the integrated sequencing capabilities of the factory boiler control:
1. Boilers will be rotated based on a sequenced order and a programmable number of run hours.
2. Boilers will be enabled/disabled at a programmable minimum firing rate and modulated in parallel to meet load requirements. For example in a two boiler system:
a. Upon call for heat in the system, the first boiler will be enabled and will modulate to the programmed minimum firing rate, for example 20%. This value is adjustable in the field.
b. If the heating load is not satisfied, the second boiler will be enabled also at 20%.
c. Both boilers will modulate up and down in parallel (infinite modulation points) to meet heating load requirements.
d. As the load decreases, the boilers will be sequentially disabled.
3. Each individual boiler can control up to three (3) devices (enable/disable only). The enable of each device, for example a pump or motorized isolation valve, will be

simultaneous to the call for heat in that boiler. This disable of each device will be based on a programmable time delay when the call for heat is no longer present.

I. Boiler safety controls shall include:
   1. Operating Temperature Controller for automatic start and stop.
   2. High Limit Temperature Controller with manual reset.
   3. One Low Water Cutoff Probe in the boiler shell.
   4. Air Safety Switch to prevent operation unless sufficient combustion air is assured.
   5. Flame detector to prove combustion.

J. All controls are to be burner or panel mounted and so located on the boiler as to provide ease of servicing the boiler without disturbing the controls. All controls shall be mounted and wired according to UL requirements.

2.07 SOURCE QUALITY CONTROL

A. Provide factory tests to check construction, controls, and operation of unit.
B. Manufacturer to conduct boiler inspection prior to shipment; submit copy of inspection report to Engineer.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Install boiler and provide connection of natural gas service in accordance with requirements of NFPA 54 and applicable codes.
C. Install boiler on 4" thick concrete housekeeping base, sized minimum of 4 inches larger than boiler base.
D. Coordinate factory installed controls with Section 230913.
E. Coordinate provisions for water treatment in accordance with Section 232500.
F. Pipe relief valves to nearest floor drain.
G. Pipe cooled condensate produced by the combustion process from the boiler condensate connection and/or flue stack with suitable piping material to neutralizer prior to discharging into nearest floor drain.
H. Provide piping connection and accessories in accordance with Section 232114.
I. Provide for connection to electrical service in accordance with Section 260583.
J. Connect vent combustion generated fumes to breeching, chimney or exhaust stack; see Section 235100.

3.02 CLOSEOUT ACTIVITIES

A. Demonstrate proper operation of equipment to Owner's designated representative.
B. Demonstration: Demonstrate operation of system to Owner's personnel.
   1. Use operation and maintenance data as reference during demonstration.
   2. Briefly describe function, operation, and maintenance of each component.
C. Training: Train Owner's personnel on operation and maintenance of system.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
   2. Provide minimum of two hours of training.
   3. Instructor: Manufacturer's training personnel.

4. Location: At project site.

D. B. Arrange with National Board of Boiler and Pressure Vessel Inspectors for inspection of boilers and piping. Obtain certification for completed boiler units, deliver to Owner, and obtain receipt.

END OF SECTION

SECTION 236426 - ROTARY-SCREW WATER CHILLERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air-cooled rotary-screw chiller.

1.02 RELATED REQUIREMENTS

A. Section 230513 - Motor Requirements for HVAC Equipment.
B. Section 230548 - Vibration Isolation.
C. Section 230553 - HVAC Identification.
D. Section 230593 - Testing, Adjusting, and Balancing for HVAC.
E. Section 230800 - Commissioning of HVAC.
F. Section 230923 - Direct-Digital Control System for HVAC.
G. Section 230993 - Sequence of Operations for HVAC Controls.
H. Section 232113 - Hydronic Piping.
I. Section 232114 - Hydronic Specialties.
J. Section 260583 - Wiring Connections.

1.03 REFERENCE STANDARDS

A. AHRI 550/590 (I-P) - Performance Rating of Water-Chilling and Heat Pump Water-Heating Packages Using the Vapor Compression Cycle; 2020, with Addendum (2022).
B. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2019, with All Amendments and Errata.
C. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
D. ASHRAE Std 135 - A Data Communication Protocol for Building Automation and Control Networks; 2020, with Errata (2023).
E. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels; 2023.
F. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus; 2019.
G. IEEE 519 - IEEE Recommended Practice and Requirements for Harmonic Control in Electric Power Systems; 2014.
H. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
I. NEMA MG 00001 - Motors and Generators; 2024.
J. UL 984 - Hermetic Refrigerant Motor-Compressors; Current Edition, Including All Revisions.
K. UL 1995 - Heating and Cooling Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate physical size, weight and location of major pieces of equipment to be installed. Notify Engineer of any major deviations from the equipment originally specified prior to ordering equipment.

1.05 SUBMITTALS

A. Product Data: Provide rated capacities, weights, specialties and accessories, electrical requirements and wiring diagrams.
B. Shop Drawings: Indicate components, assembly, dimensions, weights and loadings, required clearances, and location and size of field connections. Indicate equipment, piping and connections, valves, strainers, and thermostatic valves required for complete system.
C. Manufacturer's Instructions: Submit manufacturer's complete installation instructions.
D. Operation and Maintenance Data: Include start-up instructions, maintenance data, parts lists, controls, and accessories; include trouble-shooting guide.
E. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
B. When required, provide certification of inspection in compliance with the requirements of Authority Having Jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's written installation instructions for rigging, unloading, and transporting units.
B. Deliver units to the job site completely assembled and charged with refrigerant and oil by manufacturer.

1.08 WARRANTY

A. Manufacturer's Warranty: Provide minimum five year warranty to include coverage for materials only for compressor.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Carrier, a part of UTC Building and Industrial Systems, a unit of United Technologies Corp: www.carrier.com.

2.02 AIR-COOLED, ROTARY-SCREW, WATER CHILLER CONSTRUCTION REQUIREMENTS

A. Factory assembled and tested chiller consisting of compressor(s), compressor motor(s), motor starter(s) or variable frequency drives as indicated, evaporator, condenser, enclosure, refrigeration circuits(s) and specialties, interconnecting piping, microprocessor-based controls, readouts, and diagnostics.
    1. Rating: AHRI 550/590 (I-P).
    2. Safety: ASHRAE Std 15 and UL 1995.
    3. Construction and Testing: ASME BPVC-VIII-1.
    4. Energy Efficiency: ASHRAE Std 90.1.
    5. Enclosures:
        a. Structural Framing: Mount structural steel on welded steel base with hot-dip galvanized finish.

b. Steel Cabinet:
1) Factory apply baked on powder paint or corrosion resistant paint prior to assembly.
2) Provide gasketing and weatherproofing to panels with fully opening doors containing starters or variable frequency drives, terminal blocks, through-the-door type disconnects and circuit breaker with lockable handles indicating "power-on" or "power-off".
3) Provide door stays.
c. Perform 500-hour salt spray test in accordance with ASTM B117 for outdoor applications.

B. Rotary-Screw Compressors:
1. Unit: Semi-hermetic type with two, direct drive compressors with multiple independent refrigeration circuit(s), internal muffler, discharge, check, and suction service valves.
2. Oil Lubrication System: Positive pressure system, oil heater, oil separator, check valves, solenoid valves, and filtration devices.
3. Valves: Check valves in compressor discharge.
4. Capacity Reduction System: Load/unload valve control down to 20 percent of full load without the activation of hot gas bypass.
5. Motors: UL 984, 3,600 rpm, suction gas-cooled, hermetically sealed, squirrel cage induction with variable frequency drive.

C. Evaporator, Shell and Tube Type:
1. ASME BPVC-VIII-1, three pass type, with three independent refrigeration circuits.
2. Shell, Removable Heads and Tube Support Sheets: Carbon steel.
3. Tubes: Mechanically treated copper tubes fixed and aligned into intermediate tube support sheets across the shell to maintain consistent spacing between tubes with the capability of being cleanable.
4. Working Pressure Rating, Refrigerant-Side: 200 psi.
5. Working Pressure Rating, Water-Side: 150 psi.
6. Cold Surface Insulation:
a. Factory install on shell and all other cold surfaces.
b. 0.75-inch minimum thickness, closed cell, expanded polyvinyl chloride flexible foam insulation with a maximum K factor of 0.28.

D. Provide vents and water drain connections.

E. Provide fittings for temperature control sensors.

F. Air-Cooled Condenser:
1. Heat Exchanger:
a. Mechanically bond aluminum fins to internally enhanced, seamless copper tubing and protect with corrosion resistant materials or coatings.
b. Clean, dehydrate and test.
c. Leak Test: 506 psi.
d. Seal: Nitrogen holding charge.
2. Coil Guards: Provide expanded metal with lint screens. Protect condenser coil by enclosing with heavy plastic to prevent damage during shipping or rigging.
3. Fans and Motors:

a. Dynamically balanced propeller type, direct drive fans of reinforced polymer corrosion resistant construction and equip with sealed, permanently lubricated ball bearings.
b. Discharge Fan Guards: Coated steel wire.
c. Discharge Direction: Vertical.
d. Motors: Totally enclosed, high efficiency, suitable for outdoor use, three phase, permanent split capacitor, single speed with internal overload protection.

G. Refrigeration Circuits:
1. Provide two independent refrigeration circuit(s) with one compressor(s) per circuit.
2. Minimum Refrigerant Specialties per Circuit:
a. Isolation and service valves for refrigerant removal and charging.
b. Removable-core filter driers.
c. ASHRAE Std 15 compliant relief valves.
d. Liquid line sight glass with moisture indicator.
e. Refrigerant expansion valves or metering devices.
f. Complete operating charge of both refrigerant and oil.

H. Starters and Drives:
1. Variable Frequency Drives: Completely assemble, wire, pipe, and factory test, factory or field mounted variable frequency drive (VFD). Limit the field electrical connections for compressor motor power to the main power leads to the VFD, wiring of liquid pumps and tower fans to the control panel.
a. Characteristics:
1) Refrigerant cooled.
2) Microprocessor based pulse width modulation (PWM) with input/output power devices, DC voltage rectifier, and inverter/control regulator to convert DC voltage to sinusoidal PWM waveform.
3) Physically isolate low voltage control from main power sections.
4) Control motor speed by integrated controls over wide range of operating conditions.
5) Provide short circuit interrupt and withstand rating suitable for available current.
b. Performance:
1) Do not exceed IEEE 519 requirements for voltage total harmonic distortion (THD) and harmonic current total demand distortion (TDD) using VFD circuit breaker input terminals as the point of common coupling (PCC).
2) Full Load Efficiency: Minimum 97 percent at 100 percent VFD rated capacity.
3) Unity Displacement Power Factor: 0.99 minimum.
4) Voltage Boost Capability: Full motor voltage at reduced line voltage conditions.
5) Soft start, linear acceleration, and coast to stop capabilities.
6) Base Motor Adjustable Frequency Range: Control to 15 percent capacity at nameplate voltage.
7) Torque Generation: 150 percent instantaneous.
c. Heat Sink and Mating Flange:
1) Design for 185 psi waterside working pressure.
2) Meter to maintain temperature within acceptable limits.

d. Suitable Ratings:
    1) Operation at plus or minus 10 percent nameplate voltage.
    2) Continuous Operation at:
        (a) 100 percent of nameplate amperes and 5 seconds at 15 percent.
        (b) Ambient temperature range of 40 to122 degrees F, 95 percent humidity noncondensing for altitudes up to 6,000 feet.
    3) Comply with NEMA EN 10250 and NEMA MG 00001.
e. User Interface for Programming and Display of the Following Parameters:
    1) Operating, configuration and fault messages.
    2) Hertz frequency.
    3) VFD load, line side voltage, and current.
    4) kW.
    5) Input/output power devices temperature.
f. Electrical Service, Single Point Power:
    1) Input Circuit Breaker: Suitable for the available current indicated.
    2) Provide power for chiller oil pump via factory wired standard branch circuit breaker.
    3) Provide power for oil heater, VFD and controls via 3 kVA control power transformer and factory wired circuit breaker.
g. Discrete Dry-Contact Outputs:
    1) Circuit breaker shunt trip.
    2) Chilled water pump.
    3) Condenser water pump.
    4) Alarm status.
h. Analog Outputs: 4 to 20 mA for head pressure reference and condenser water control valve as applicable.
i. Provide protection for under/over-voltage, phase loss/reversal/unbalance, ground fault, single cycle voltage loss, programmable auto restart after power loss, and motor overload/over temperature protection.

I. Controls Package:
1. Unit Controls: Factory-supplied DDC:
    a. Control-panel mounted with required input-output expansions, power supply, fused disconnect, hand switches, knobs, and accessories required to control chiller unit to manufacturer required sequences to meet intended use with listed performance.
    b. Factory configured to interface prewired sensors, switches, and safeties with allowance to add up to four chiller valves and flow sensors.
    c. Graphic-based touchscreen to include unit operation controls and user filter based interface for faults, alarms, performance, unit diagnostics, and data recording up to 12 months.
    d. BAS, SCADA, or other Integrated Automation Link: ASHRAE Std 135 BACnet MS/TP.
    e. External Point Mapping: Provide mapping table for each parameter included in the local visual interface with software-toggle flag to allow reduced mapping of available points.

f. Isolation Valves: Field-installed, 2-position, butterfly type with position tracking; see Section 253519.

2. Control Components for Preventing Shutdown:
   a. Provide high pressure limit with indicating light for each compressor, set lower than factory pressure switch to automatically unload compressor and prevent nuisance high pressure condenser control trip.
   b. Provide one protector with indicating light for each compressor, with current limit setpoint of 120 percent of compressor running load amperage to automatically unload compressor preventing over-current trip.
   c. Provide low refrigerant limit to automatically unload each compressor preventing a low evaporator temperature trip.
3. Chiller Operation in Abnormal Operating Conditions:
   a. Unloaded Running: Adequate chilled water production.
   b. Trip-out Limit Reached: Chiller goes off-line and manual reset is required for continued operation.
4. Control Panel Display:
   a. Evaporator pressure.
   b. Condenser refrigerant pressure.
   c. Entering and leaving evaporator water temperature.
5. Points for Remote Monitoring and Control:
   a. Entering and leaving condenser water temperature as applicable.
   b. Chilled water setpoint.
   c. Electrical 3 phase current limit and percent RLA setpoint.
   d. Electrical 3 phase amp draw.
   e. Chiller operating mode.
   f. Condenser refrigerant temperature.
   g. Elapsed time and number of starts counter.
   h. Chiller compressor run status relay.
   i. Minimum of 20 diagnostics with time and date stamp.
   j. Identification of the fault, date, time and operating mode at time of occurrence, type of reset required, and help message.
   k. Relay output energized upon detecting a fault requiring manual reset.
   l. Relay output energized whenever unit is operating in a limit mode for an extended period of time.
   m. Analog input to control leaving chilled water temperature setpoint based upon a 4-20ma or 0-10 VDC signal from the building automation system.
   n. Programmable soft during pull-down period via ramped current limit or fully adjustable, temperature pull-down rate.
   o. Leaving chilled water reset based upon return water temperature.
   p. Provide RS-232 for printer interface.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Align chiller package on steel or concrete foundations.

C. Install units on vibration isolators.
D. Connect to electrical service.
E. Connect to chilled water piping.
F. Connect to condenser water piping.
G. Arrange piping for easy dismantling to permit tube cleaning and removal.

3.02 MANUFACTURER'S FIELD SERVICES

A. Perform factory startup of the chiller by factory trained and authorized servicing technicians confirming equipment has been correctly installed prior to equipment becoming operational and covered under the manufacturer's warranty.
B. Supply initial charge of refrigerant and oil if not completely factory charged.
C. Demonstrate system operations and verify specified performance.

3.03 CLOSEOUT ACTIVITIES

A. Demonstrate proper operation of equipment to Owner's designated representative.
B. Training: Train Owner's personnel on operation and maintenance of system.
    1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
    2. Provide minimum of one day of training.
    3. Instructor: Manufacturer's training personnel.
    4. Location: At project site.

END OF SECTION

SECTION 238126.13 - SMALL-CAPACITY SPLIT-SYSTEM AIR CONDITIONERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air cooled condensing units.
B. Indoor air handling (fan and coil) units for ductless systems.
C. Controls.

1.02 RELATED REQUIREMENTS

A. Section 230913 - Instrumentation and Control Devices for HVAC: Thermostats, humidistats, time clocks.
B. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections and installation and wiring of thermostats and other controls components.

1.03 REFERENCE STANDARDS

A. AHRI 210/240 - Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2023.
B. AHRI 270 (SI/I-P) - Sound Performance Rating of Outdoor Unitary Equipment; 2025.
C. AHRI 520 - Performance Rating of Positive Displacement Condensing Units; 2004.
D. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2019, with All Amendments and Errata.
E. ASHRAE Std 23.1 - Methods for Performance Testing Positive Displacement Refrigerant Compressors and Condensing Units that Operate at Subcritical Pressures of the Refrigerant; 2019.
F. ASHRAE Std 52.1 - Gravimetric and Dust-Spot Procedures for Testing Air-Cleaning Devices Used in General Ventilation for Removing Particulate Matter; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.{ch#16}
G. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2021.
H. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2021.
I. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
B. Shop Drawings: Indicate assembly, required clearances, and location and size of field connections.
C. Design Data: Indicate refrigerant pipe sizing.
D. Manufacturer's Instructions: Indicate rigging, assembly, and installation instructions.
E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.
F. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.06 WARRANTY

A. Provide five year manufacturers warranty (parts and labor) for compressors.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Carrier Corporation: www.carrier.com.

2.02 SYSTEM DESIGN

A. Split-System Heating and Cooling Units: Self-contained, packaged, matched factory-engineered and assembled, pre-wired indoor and outdoor units; UL listed.
   1. Heating and Cooling: Air-source electric heat pump located in outdoor unit with evaporator.
   2. Provide refrigerant lines internal to units and between indoor and outdoor units, factory cleaned, dried, pressurized and sealed, with insulated suction line.

2.03 INDOOR AIR HANDLING UNITS FOR DUCTLESS SYSTEMS

A. Indoor Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, evaporator coil, and controls; wired for single power connection with control transformer.
B. Evaporator Coils: Copper tube aluminum fin assembly, galvanized or polymer drain pan sloped in all directions to drain, drain connection, refrigerant piping connections, restricted distributor or thermostatic expansion valve.
   1. Construction and Ratings: In accordance with AHRI 210/240 and UL 207.
   2. Manufacturer: System manufacturer.

2.04 OUTDOOR UNITS

A. Outdoor Units: Self-contained, packaged, pre-wired unit consisting of cabinet, with compressor and condenser.
   1. Construction and Ratings: In accordance with AHRI 210/240 with testing in accordance with ASHRAE Std 23.1 and UL 207.
B. Air Cooled Condenser: Aluminum fin and copper tube coil, AHRI 520 with direct drive axial propeller fan resiliently mounted, galvanized fan guard.
C. Accessories: Filter drier, high pressure switch (manual reset), low pressure switch (automatic reset), service valves and gauge ports, thermometer well (in liquid line).
   1. Provide thermostatic expansion valves.
D. Operating Controls:
   1. Control by room thermostat to maintain room temperature setting.

2.05 ACCESSORY EQUIPMENT

A. Room Thermostat: Wall-mounted, electric solid state microcomputer based room thermostat with remote sensor to maintain temperature setting; low-voltage; with following features:

1. Automatic switching from heating to cooling.
2. Preferential rate control to minimize overshoot and deviation from setpoint.
3. Thermostat Display:
    a. Actual room temperature.
    b. System Mode Indication: Heating, Cooling, Fan Auto, Off, and On, Auto or On, Off.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.
B. Verify that proper power supply is available and in correct location.

3.02 INSTALLATION

A. Install in accordance with NFPA 90A and NFPA 90B.

END OF SECTION

SECTION 260010 - BASIC ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.01 GENERAL CONDITIONS

A. The General Conditions of the Contract for the Construction of Buildings, Standard Form of the American Institute of Architects current edition, The Supplementary General Conditions and the Mechanical and Electrical Special Conditions are a part of these specifications.

1.02 WORK INCLUDED

A. Basic Electrical Requirements are specifically applicable to Divisions 26, 27 & 28.
B. This specification and accompanying plans cover and shall govern the installation of a complete electrical system, all as specifically set forth herein, and as indicated in the plans.
C. The drawings and these specifications are complementary each to the other, and what is called for by one shall be as binding as if called for by both. They are intended to include everything requisite and necessary to the entire finishing of the work notwithstanding that every item necessarily required by such work is not especially mentioned or shown.
D. This Contractor shall furnish all labor and material necessary for the complete system and items of work including (but not limited to):
    1. All work complaint with the latest edition of the National Electrical Code and the National Fire Alarm and Signaling Code
    2. All work complaint with Illinois Administrative Code (IAC) 180 and all building codes as listed in IAC Section 180.60
    3. Minor Electrical Demolition
    4. Building Wire and Cable
    5. Cutting, Patching, Sleeves, Hanges and Support
    6. Conduit
    7. Surface Raceway
    8. Above Ceiling J-Hooks
    9. Boxes
    10. Identification for Electrical Systems
    11. Equipment wiring
    12. Wiring Devices
    13. Enclosed Switches
    14. Interior Lighting
    15. Exterior Lighting
    16. Lighting Control - Hubbell NX
    17. Structured Cabling for Voice and Data
    18. New Master Clock System
    19. Extension/Modification of Existing Access Control System
    20. Video Surveillance System
    21. New Fire Alarm and Mass Notification System
E. Contractor will distinctly understand that the work described herein is to be a finished job, and the whole completed in a workmanlike manner. The omission from either the drawings or specifications of minor details which ordinarily form a part of first class work of this character and are necessary to the completion of this project as contemplated and described, shall not be a

cause for any extra cost, but shall be included by this Contractor as if specifically mentioned or shown.

1.03 REFERENCES

A. Materials, equipment and installation thereof shall conform to the latest editions of the following:
   1. ANSI - American National Standards Institute
   2. ASTM - American Society for Testing Materials
   3. CBM - Certified Ballast Manufactueres
   4. ETL - Electrical Testing Laboratories
   5. IEEE - Institute of Electrical and Electronic Engineers
   6. NBS - National Bureau of Standards
   7. NEMA - National Electrical Manufacturer's Association
   8. NFPA - National Fire Protection Association
   9. OSHA - Occupation Safety and Health Act.
   10. UL - Underwriters Laboratores
   11. BOCA - Building Officials & Code Administrators International, Inc.
   12. IES - Illuminating Engineering Society of North America
   13. NFPA 70 - National Electrical Code: Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
   14. IAC 180 - Illinois Administrative Code 180
   15. All materials, equipment, and installation thereof shall conform to the standards of the National Electrical Manufacturers Association (NEMA) and of the Underwriters' Laboratories (UL)
B. Notify the Architect/Engineer of any materials or apparatus believed to be inadequate, unsuitable, in violation of laws, ordinances, rules or regulations of authorities having jurisdiction.
C. In every installation where regulations of electric utility and telephone companies apply, conformance with their regulations is mandatory and any costs involved shall be included in the Contract, with the exception of extra facility and other charges which are directly paid by the Owner. or as otherwise instructed herein.

1.04 SUBMITTALS

A. Submit under provisions as described within the general requirements section.
B. Proposed Products List: Include Products specified in each Division 26, 27 & 28 Section:
C. Submit shop drawings and product data grouped to include complete submittals of related systems, products and accessories in a single submittal.
D. Mark dimensions and values in units to match those specified.
E. Contractor shall review all shop drawings prior to submitting them for Architect/Engineer's review. Contractor shall stamp each shop drawing to certify that he has reviewed it. Engineer will not check any drawings that Contractor has not stamped with his review certification.
F. Owner's representative shall review all materials, equipment, fixtures, motor control centers, panelboards, control panels, etc., and other appurtenances provided for this work before proceeding with the purchase and installation.
G. All submittals shall include adequate descriptive literature, catalog cuts, shop drawings and other data necessary for the Owner's Representative to ascertain that the proposed

equipment/fixtures and materials comply with specification requirements. Catalog cuts submitted for approval shall be legible and clearly identify equipment/fixtures being submitted.

H. Submittals for individual system and equipment assemblies which consist of more than one item or component shall be made for the system as a whole. Where necessary, submit plans of the system drawing on sheet sizes same as the contract drawings. Partial submittals will not be considered for approval.

I. Owner's Representative review of shop drawings will be rendered as a service only and shall not be considered as a guarantee of measurements or of building conditions, nor shall it be construed as relieving the Contractor of basic responsibilities under his contract.

J. If the shop drawings show variations from contract requirements because of shop practice or other reasons, Contractor shall make specific reference to such variation in his letter of transmittal in order that, of acceptable, suitable action may be taken for proper adjustment; otherwise Contractor will not be relieved of the responsibility for executing the work in accordance with contract documents even though such shop drawings have been reviewed.

K. All shop drawings shall be submitted to permit Owner's Representative ample time to review before material is released for delivery to job.

L. Contractor shall maintain a permanent file of shop drawings to turn over to Owner's Representative at completion of project.

M. Submitals shall include 1/4" = 1'-0" dimensioned drawings of all electrical equipment rooms for review before installation continues.

N. Coordination and Record Drawings:

1. In addition to the preparation and submittal of shop drawings and product data for manufactured electrical equipment and materials, prepare and maintain in current status, a complete set of detailed, completely circuited, and dimensioned electrical record drawings for electrical work included under the Contract.
2. In addition to the floor and ceiling plans, layouts of all functionally critical areas and congested areas, such as mechanical and electrical equipment rooms. shall be drawn at a minimum scale of 1/4" equals 1'-0" with all details of construction shown.
3. Record drawings shall be made under the direction and supervision of the Contractor and shall show all electrical work inclusive of conduit, wiring, electrical equipment and devices, lighting fixture locations and elevations, points where conduit enters or leaves structural slabs and walls, junction boxes, conduit supports and inserts. The complete electrical distribution system from source or sources up to and including each branch circuit panelboard shall be shown and dimensioned exactly as installed, with all feeders located on plan. Major equipment and apparatus shall be shown to scale and properly located. Drawings shall also show locations and depths of underground conduits and ducts and their terminations, as installed.
4. Coordination drawings shall be made on 3 mil mylar sheets or CAD drawing compatible with AutoCAD Version 14.0 of the same size and with the same border lines and title blocks as the Architect/Engineer's Drawings, with the Contractor's name added.
5. Coordinate electrical work with the work of other trades and in preparing the record drawings, check the work of other trades in order to avoid possible installation conflicts arising therefrom. In the event of conflicts of interferences that cannot be resolved in the field, request a written clarification from the Architect/Engineer.
6. Record drawings shall indicate the electrical installation exactly as constructed and shall be periodically revised to reflect all changes, including those required by the Architect/Engineer, those which are or have been found necessary in the field and those which may be suggested by the Contractor and accepted by the Architect/Engineer.

Drawings shall be revised when considered necessary the the Architect/Engineer or the Contractor in order to facilitate proper coordination.

7. If, in the opinion of the Architect/Engineer, the drawings are in acceptable condition after each has been finally revised, they may be submitted as the field record drawings.

O. Equipment Drawings:
   1. Provide complete set of shop drawings bound in permanent binder.
   2. Provide typewritten list of each type, quantity and manufacturer of lamp installed.
   3. Provide typewritten list of each type, quantity, size and manufacturer of fuse, motor overload heater, etc., installed.
   4. Provide a complete list of all replaceable components for maintenance purposes.

P. Maintenance and Operating Manuals
   1. Maintenance and Operation Manual, submit as required for systems and equipment specified in the technical sections. Furnish five (5) copies, bound in hardback binders, manufacturer's standard binders or an approved equivalent. Furnish one complete manual as specified in the technical section, but in no case later than prior to performance of systems or equipment test, and furnish the remaining manuals prior to contract completion.
   2. Inscribe the following identification on the cover: the works "MAINTENANCE AND OPERATION MANUAL", the name and location of the system, equipment, building, name of Contractor and contract number. Include in the manual the names, addresses and telephone numbers of each subcontractor installing the system or equipment and the local representatives for the system or equipment.
   3. Provide a "Table of Contents" and assemble the manual to conform to the table of contents, with tab sheets placed before instructions covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in.
   4. The manual shall include:
      a. Internal and interconnecting wiring and control diagrams with data to explain detailed operation and control of the equipment.
      b. A control sequence describing start-up, operation and shutdown.
      c. Description of the function of each principal item of equipment.
      d. Installation and maintenance instructions.
      e. Safety precautions.
      f. Diagrams and illustrations.
      g. Testing methods.
      h. Performance data.
      i. Lubrication schedule including type, grade, temperature range and frequency.
      j. Pictorial "exploded" parts list with part numbers. Emphasis shall be placed on the use of special tools and instruments. The list shall indicate sources of supply, recommended spare parts and name of servicing organization.
      k. Appendix; list qualified permanent servicing organizations for support of the equipment, including addresses and certified qualifications.

Q. POSTED OPERATING INSTRUCTIONS
   1. Furnish approved operating instructions for systems and equipment indicated in the technical sections for use by operation personnel. The operating instructions shall include wiring diagrams, control diagrams and controls sequence for each principal system and equipment. Print or engrave operating instructions and frame under glass or in approved laminated plastic. Post instructions were directed. Attach or post operating instructions

adjacent to each principal system and equipment including start-up, operating, shutdown, safety precautions and procedure in the event of equipment failure. Provide weather-resistant materials or weatherproof enclosures for operating instructions exposed to the weather. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal.

1.05 REGULATORY REQUIREMENTS

A. The work shall be performed in accordance with codes, laws, and ordinances of Federal, State and local governing bodies having jurisdiction.
B. In case of differences between building codes, Federal and State laws, local ordinaces and utility company regulations and the Contract Documents, the most stringent shall govern.
C. Electrical: Conform to the latest edition of NFPA 70 (National Electrical Code)
D. Fire Alarm: Conform to the latest edition of NFPA 72 (National Fire Alarm and Signaling Code)
E. Conform to Illinois Administrative Code 180 and all building codes as listed in IAC section 180.60
F. Obtain permits and request inspections from authority having jurisdiction.
G. Obtain approvals, where required, from inspection authorities for exit, emergency lighting, fire alarm device locations, and other electrical installations requiring specific approval. Prints of the Electrical Drawings, for this purpose, will be furnished by the Architect on request. Required wiring diagrams shall be provided and submitted for approval by the Contractor. Copies of the final approved drawings shall be delivered to the Architect. Approvals shall be obtained before commencement of related work.
H. Pay all fees, and other charges incident to electrical work and obtain and pay for required insurance, permits, licenses, and inspections. Arrange for all required inspections and deliver certificates and approval for same to the Architect, as a requirement for final payment.

1.06 PROJECT/SITE CONDITIONS

A. The drawings furnished in the bid set are to give the general intent of the mechanical and electrical requirements. All information for installation is not shown and is not fully coordinated with Architectural and Mechanical drawing and specifications. They are not intended as final installation drawings, although they may be used as a guide if the Contractor feels that sufficient information for installation is shown. Installation must be fully coordinated with all trades. If it is necessary to clarify or provide more detail than is shown, this Contractor shall prepare drawings and submit the same for review and comment.
B. Carefully examine the contract documents, visit the site, and thoroughly become familiar with the local conditions relating to the work. Failure to do so will not relieve the contractor of the Contract.
C. Install Work in locations shown on Drawings, unless prevented by Project conditions.
D. Prepare drawings showing proposed rearrangement of Work to meet Project Conditions, including changes to Work specified in other Sections. Obtain permission of Architect/Engineer before proceeding.

1.07 CONTRACTOR'S RESPONSIBILITY TO VERIFY EQUIPMENT DIMENSIONS

A. Before ordering any materials or proceeding with the work, this Contractor shall verify all measurements at the site and be responsible for correctness of same. No extra compensation will be allowed because of difference between the actual measurements and dimensions

indicated on the drawings. Any difference which may be found shall be submitted to the Architect's Superintendent on the job for rectification before proceeding with the work.

B. Contractor and/or manufacturer shall verify that the capacity and duty specified meets the characteristics of the equipment he submits for review.

C. If equipment is submitted for review and does not meet the physical size or arrangement of what was scheduled and specified, Contractor shall pay for all alternations required to accommodate such equipment at no additional cost to the Owner. Contractor shall also pay all costs for additional work required by other Contractors, Owner, Architect or Engineer to make changes which would allow the equipment to fit the space.

1.08 CONTRACTOR'S RESPONSIBILITY TO VERIFY EXISTING CONDITIONS AND OPENINGS

A. Contractor shall field verify the size of existing openings, windows, doors, corridors, rooms, etc. for access of the new equipment into the existing building. If openings are too small for access, then Contractor shall provide new or enlarged openings, at his own expense, to facilitate entrance into existing space or building. Contractor may elect to order the equipment disassembled and/or with split housing for entrance into the existing space or building. Contractor shall reassemble equipment after it is in the space at his own expense.

1.09 OCCUPANCY ADJUSTMENTS

A. Provide on-site assistance in testing and verification of systems for this project to meet occupancy conditions.

B. Provide up to three on-site assistance visits within one year of Substantial Completion.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Proposal shall be based upon the furnishing of all materials and equipment as specified, which in every case shall be new and, where not specifically referred to by manufacturer's name, of the best grade and quality available.

B. Materials used through this installation shall be new (without blemish or defect) and the best of their respective kind and the same shall be installed in a neat, accurate, and workmanlike manner, and in a manner to permit the work of other trades to also be installed wherever the work covered by this specification meets with, or must be considered, in connection with the work of other trades working on this installation. Equipment shall not be used for temporary light and power purposes, including lamps. This workmanship and these materials must be executed and furnished in a manner entirely satisfactory to the Owner's Representative.

C. Items of equipment of within a specificy category type (such as fuses, conduit, electrical distribution equipment [distribution switchboards, panelboards, motor starters, enclosed switches] wiring systems), shall be the product of one manufacturer throughout, unless otherwise indicated or accepted by the Architect/Engineer.

D. Where two types of similar equipment are specified or shown on the drawings, the Base Bid will be based on the higher quality or greater number. All work shown on the drawings & specifications will be adjusted to comply with all sections of the Local Codes.

E. Wherever in the specifications, a particular article or material is definitely mentioned, it shall be provided and no substitutions shall be allowed, especially insofar as the submittal of the base bid is concerned. Should this Contractor desire to substitute other materials for those specified, he may submit these substitutions in the form of voluntary alternates to the base bid, designating appropriate additions or deductions for each alternate. Should no alternates be submitted, the contract shall be entered into on the basis of the specified base bid equipment.

Final review of equipment shall be by the Owner's Representative. Voluntary alternates will only be recognized at the time of bid.

F. A specification item followed by one (1) or more manufacturers; names of other manufacturers may be submitted for review to the Owner's Representative a minimum of seven (7) days prior to receiving bids. Acceptance will be granted only if issued by addendum (no exceptions).

G. A specification item followed by one (1) or more manufacturers and "or equal" is open to all equal products or materials. However, Contractor shall supply one (1) of the listed manufacturers at no additional cost if Owner's Representative determines substituted product unsatisfactory.

PART 3 EXECUTION

3.01 DELIVERY AND STORAGE

A. Receive, handle, and store electrical items and materials at the project site. Materials and electrical items shall be so placed that they are protected from damage and deterioration. Damaged or othjerwise unsuitable materials and electrical items shall be immediately removed from the site.

3.02 INSTALLATION

A. The Drawings for work under Divisions 26, 27 & 28 are diagrammatic and are intended to convey the scope of work and indicate the general arrangement of conduit, boxes, equipment, devices, fixtures and other work included in the Contract.

B. Location of items required by the Drawings or specifications not fixed by dimensions are approximate only and exact locations necessary to secure the best conditions and results shall be determined at the site and shall be subject to the approval of the Architect/Engineer. The Contractor shall be responsible for exact/final location and coordination of all devices and in case any devices are not installed in correct location, Contractor shall move same including all necessary cutting and patching at Contractor's expense.

C. Owner reserves right to change position of any/all devices or fixtures within 10'-0" radius before work is installed without extra charge.

D. Check with Heating Contractor as to location of radiation, Ventilation Contractor as to location of ducts and grilles, and Plumbing Contractor as to location of piping before installing the work.

E. Contractor shall consult with the Architect and review the plans to verify the exact locations of all outlets and mounting heights to insure that all outlets are above counters where cabinet work and/or furniture occurs and switches are at the correct side of door swings.

F. This Contractor shall consult with the Equipment Suppliers for the correct sizes of all outlets in sufficient time before wall construction.

G. Follow drawings in layout out work, check drawings of other trades to verify spaces in which work will be installed, and maintain maximum headroom and space conditions at all points.

H. Where headroom or space conditions appear inadequate, the Architect/Engineer shall be notified before proceeding with installation.

I. Minor conduit rerouting and changes shall be made at no additional cost to the Owner.

J. Whenever it becomes necessary for the complete fulfillment of this specification to furnish labor or materials, other than that which is generally accepted by trade agreement or general practice to belong to his particular trade or branch of work, he shall sublet such work or shall employ workmen regularly employed, to the end that there will be no delay or stoppage of work due to infringement or alleged infringement of trade agreements as to jurisdiction.

K. Perform all work with skilled mechanics of the particular trade involved in a neat and workmanlike manner.

L. Furnish other trades advance information on locations and sizes of frames, boxes, sleeves and openings needed for the work, and also furnish information and shop drawings necessary to permit trades affected to install their work properly and without delay.

M. Where there is evidence that work of one trade will interfere with the work of other trades, all trades shall assist in working out space allocations to make satisfactory adjustments and shall be prepared to submit and revise coordinate shop drawings.

N. With the approval of the Architect/Engineer and without additional cost to the Owner, make minor modifications in the work as required by structural interferences, by interferences with work of other trades or for proper execution of the work.

O. Work installed before coordinating with other trades so as to cause interference with the work of such other trades shall be changed to correct such condition without additional cost to the Owner and as directed by the Architect/Engineer.

P. Equipment shall be installed with adequate space allowed for removal, repair or changes to equipment. Ready accessibility to removable parts of equipment and to wiring shall be provided without moving other equipment which is to be installed or which is in place. Electrical Contractor shall verify measurements. Discrepancies shall be brought to the Architect/Engineer's attention for interpretation.

Q. Determine temporary openings in the buildings that will be required for the admission of apparatus furnished under this Division, and notify the Architect/Engineer accordingly. In the event of failure to give sufficient notice in time to arrange for these openings during construction, assume all costs of providing such openings thereafter.

R. Location of electrical outlets, lighting panels, cabinets, equipment, etc. is approximate and exact locations shall be determined at the project.

S. Electrical Contractor shall refer to contract documents for details, reflected ceiling plans, and large scale drawings.

T. Equipment shall be installed with ample space allowed for its removal for repairs or changes. Ready accessibility to removable parts of equipment and to wiring shall be provided so that other equipment, in place or to be installed, need not be moved at any time.

U. Sufficient access for the installation of electrical equipment shall be determined prior to delivery.

V. Compare all contract drawings and specifications to determine the intent of the two together. In case of any discrepancy between the drawings and specifications, the matter shall be referred to the Owner's Representative before any work is installed. The interpretation of the intent shall rest solely with the Owner's Representative, and his decision shall be considered final.

W. Any changes of the electrical layout necessary to make the work conform to the entire facility as construction, fit the work of other trades or conform to the rules of the city and state and/or other regulating bodies (Public Health, NFPA, etc.), shall be made without additional cost.

X. Omission in the contract drawings and/or specifications of any items necessary for the proper completion or operation of the work outlined in this specification shall not relieve the Contractor from furnishing same without additional cost.

Y. WORK BY OTHERS

1. Except as otherwise noted or specified, this Contractor shall not include the following apparatus which shall be provided under other contracts: Electric motors will be set on foundation by others, but shall be wired by this Contractor.
2. All apparatus furnished by others to this Contractor shall be carefully protected, neatly connected, and shall be put in first class condition at time it is submitted for acceptance.

The Contractor shall receive all equipment, sign for same and be responsible for its safety.

3. This Contractor shall coordinate with controls Contractor to ensure that all starters and equipment are the proper type, have proper interlocks, holding coils, voltage, etc.. This Contractor will check starter overloads with actual motor full load current nameplate rating.
    a. Motors with a marked service factor not less than 1.15 or marked with a temperature rise not over 40degrees C. shall be set at 125%.
    b. All other motors shall be set at 115%.
4. Temperature controls wiring and conduit will be furnished and installed under Heating Contract.
5. Control wiring for all plumbing motors, hot water circulating pumps, domestic hot water recirculating pumps, sump pumps, sewage ejector, etc., will be installed and wired by the Electrical Contractor.

3.03 PROTECTION

A. Protect conduit and wireway openings against the entrance of foreign matter by means of plugs or caps. Cover fixtures, materials, equipment and devices or otherwise protect against damage from any cause, both before and after installation. Fixtures, materials, equipment, or condition or replaced, all at no additional cost to Owner.
B. Equipment shall be inherently safe and moving parts shall be covered with guards.

3.04 COOPERATION

A. Where jurisdictional rules require the assistance of electrical mechanics in the moving and setting of electrically powered equipment, provide such assistance.
B. Where work covered by this section connects to equipment furnished under other sections, verify electrical work involved in the field and make proper connection to such equipment.

3.05 FINAL COMPLETION

A. Work shall be cleaned prior to the date of "substantial completion" as determined by the Owner's Representative.
B. Clean equipment, restore all damaged materials, remove grease, oil, chemicals, paint spots and/or stains, etc., and generally leave the work in A-1 condition.
C. Retouch and/or repaint all factory painted prime and/or finish coats where scratched or damaged. Wherever retouching will not be satisfactory, in the opinion of the Owner's Representative, the Owner's Representative had the option to require complete repainting until the desired appearance is obtained.
D. Lamps, fixtures, lenses, reflectors, etc., shall be cleaned and not sooner than ten (10) days prior to date of substantial completion.
E. Remove from site all tools, equipment, surplus materials, and rubbish pertaining to contract work and include all costs for such removal and disposition. All rubbish left will be removed by Owner and services for same shall be back-charged to Contractor against final payout on contract.

3.06 INSTRUCTIONS AND TRAINING

A. The Contractor shall instruct the Owner's personnel in the operation and maintenance of equipment installed as part of this Project. In addition, the Contractor shall furnish the Owner

three (3) sets of typewritten instructions. The Contractor shall also furnish to the Owner three (3) sets of equipment maintenance and operations manuals for each item of equipment.

B. In addition to written instructions the Contractor shall provide field instruction as follows.
   1. Two sessions for a total hours of 8 hours

C. Notify the Architect seven days in advance of all instruction sessions so the Architect can coordinate with the Owner and be present.

D. For each session, the Contractor shall submit a training session log prepared by the Contractor and signed by the Owner and the Contractor. The log shall certify that the above has been satisfactorily completed and that the Owner's copies of manuals and written instruction were on hand at the time of the session.

E. All training sessions shall be video taped and two copies shall be provided to the Owner.

F. The training sessions shall be coordinated by the Contractor with all Subcontractors to avoid numerous trips by the Owner.

3.07 TESTING AND INSPECTIONS

A. Verify motors for proper rotation prior to operation.

B. Test all motor controls for proper operations.

C. Test all duplex receptacles for proper polarity and grounding.

D. Measure, load, and record readings on all feeders, motors, transformers and panelboards, etc. Reconnect panelboard loads as may be necessary to obtain a reasonable balance of loads on all phases. Variation shall not exceed 10% phase to phase.

E. Provide three (3) typewritten copies of the recordings in bound booklets prior to request for final payment.

F. Demonstrate by tests, at the request of the Owner's Representative, the compliance of the installation with these specifications, the drawings, the National Electric Code, and the accepted standards of good workmanship. These tests shall include operation of lights and equipment, continuity of the conduit system, grounding resistances, and insulation resistances on not more than ten (10) representative circuits and any other circuits for which a justifiable reason exists for such tests. All labor and testing equipment for the performance of these tests shall be furnished by the Contractor.

3.08 GUARANTEE

A. Where not specifically described elsewhere within this electrical specification section, the complete electrical system as indicated on the drawings and in these specifications shall be guaranteed by this Contractor for one (1) year from date of final acceptance by the Architect against defective material and workmanship. Defective workmanship and material developing during the guarantee period shall be repaired or replaced by this Contractor without cost to the Owner.

B. Upon receipt of written notice from the Owner or Architect of failure of any part of the guaranteed materials or equipment during the guarantee period, the affected part or parts shall be repaired or replaced with new, by and at the expense of the Electrical Contractor.

C. Make all service calls, replacements, repairs and adjustments during the guarantee period without cost to Owner.

END OF SECTION

SECTION 260505 - SELECTIVE DEMOLITION FOR ELECTRICAL

PART 1 GENERAL

1.01 GENERAL CONDITIONS

A. Perform whatever work and provide whatever materials are required in order to remove, reroute, relocate, or in other ways alter the existing work in order to accommodate new work requirements. Such performance as generally outlined herein and as found necessary under field conditions shall be considered as included in the base bid Contract.
B. The Electrical Drawings are generally instructive of the alterations which involve the existing electrical work. It is not intended that such alterations be limited to these instruction.
C. Existing electrical materials and equipment, including lighting fixtures, switches, receptacles, signal lights, speakers, intercom equipment, controls, conduit outlets, fittings, wire cable, and other devices which are removed as a result of the alterations shall remain the property of the Owner and shall be stored on the site as directed. All equipment which the Owner does not want will become the property of this Contractor and will be promptly removed from the site.
D. Various signal, communications, and other services shall remain in service to provide continuous operation for the Owner's functions. No interruptions of any services will be allowed without written approval from the Architect.
E. The building electrical service and/or fire alarm system must be kept in operation at all times during normal operating hours. the only time these services will be interrupted will be after normal hours or on weekends. The owner will be consulted for any interruptions and permission given in writing. Temporary service for heating or sump pumps must be provided for as may be necessary. All overtime or extra cost necessary to provide for the above will be included in the base bid.

1.02 PROLONGED POWER OUTAGE

A. Prolonged power outage shall be defined as any period where electrical power is shut down for a period of four or more hours.
B. Before shutting down building power for a prolonged period, test all existing battery emergency lights and exit signs. Provide written report regarding device status. Failure to do so will imply that all battery units are properly functioning at the beginning of the prolonged power outage.
C. Disconnect all batteries from emergency lights and exit signs before any prolonged power outage.
D. Provide back-up electrical power (emergency generator, UPS unit, or temporary power for construction) for the following loads: fire alarm control panel and all associated notification appliance panels, and intrusion detection system.
E. Upon re-application of electrical power, test all battery emergency lights and exit signs for proper operation. Provide written report regarding device status.

1.03 SECTION INCLUDES

A. Electrical demolition.

1.04 RELATED REQUIREMENTS

A. Section 028400 - Polychlorinate Biphenyl (PCB) Remediation: Removal of equipment and materials containing substances regulated under the Federal Toxic Substances Control Act (TSCA), including but not limited to those containing PCBs and mercury.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.01 INSTALLATION

A. GENERAL
   1. Remove suspended acoustical ceiling and/or tiles necessary to facilitate the installation of the electrical work indicated on the drawings and specified herein, and restore the ceiling and tiles after completion of the electrical work. Replace any ceiling tiles damaged during the work, with new tiles to match the existing in every respect, without any additional cost to the Owner.
   2. Where it is called for in the drawings to provide for circuits as required, it will be the responsibility of the Electrical Contractor to add new circuit breakers to existing spaces, connect to existing spare circuit breakers or provide a new 12 circuit breaker panelboard adjacent to existing panel. Provide main breaker as required for panel protection. Where it is called for in the drawings to connect to existing wiring, lighting, outlets, motor circuits, etc., it will be the Contractor's responsibility to thoroughly check all locations and details during the bid period and provide all necessary appurtenances and equipment to furnish and install all that is necessary.

3.02 EXAMINATION

A. The contractor must visit the site to familiarize himself with the existing site and building conditions which will be affected during construction prior to submitting his bid proposal. Contractor is cautioned that the project is a remodeling job and it is assumed that he has included funds in his bid to cover unforeseen items which must be moved, relocated or adjusted to fit his work. No extra compensation will be allowed.
B. Verify that abandoned wiring and equipment serve only abandoned facilities.
C. Demolition drawings are based on casual field observation and existing record documents.
D. Beginning of demolition means installer accepts existing conditions.

3.03 PREPARATION

A. Contractor shall refer to the Architectural. Mechanical and Electrical Drawings to determine the extent of remodeling work. All new and existing conduits shall be run concealed in areas where new and existing ceilings and dropped soffits finishes are installed. Where channeling and cutting is not feasible, or extremely difficult, finished surface raceway will be used. Where surface is used it must be approved by the Engineer. In some areas, it will be necessary to route the conduit in a manner other than the shortest distance between two outlets in order to maximize the concealment of the work. All cut and/or channeled surfaces will be restored to its original condition by the Electrical Contractor using skilled tradesman ordinarily employed for such specialty.
B. Confer with the manufacturers of existing equipment that is to be revised or extended, and include in the base bid all work necessary of the proper completion of same.
C. The contractor must visit the site to familiarize himself with the existing site and building conditions which will be affected during construction prior to submitting his bid proposal.

Contractor is cautioned that the project is a remodeling job and it is assumed that he has included funds in his bid to cover unforeseen items which must be moved, relocated or adjusted to fit his work. No extra compensation will be allowed.

D. Disconnect electrical systems in walls, floors, and ceilings to be removed.

E. Coordinate utility service outages with utility company.

F. Provide temporary wiring and connections to maintain existing systems (heat, fire alarm, etc.) in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

G. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
   1. Obtain permission from Ownerat least 24 hours before partially or completely disabling system.
   2. Make temporary connections to maintain service in areas adjacent to work area.

H. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Minimize outage duration.
   1. Notify Owner before partially or completely disabling system.
   2. Notify local fire service.
   3. Make notifications at least 24 hours in advance.
   4. Make temporary connections to maintain service in areas adjacent to work area.

I. Existing Telephone System: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
   1. Notify Owner at least 24 hours before partially or completely disabling system.
   2. Notify telephone utility company at least 24 hours before partially or completely disabling system.
   3. Make temporary connections to maintain service in areas adjacent to work area.

3.04 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Where existing electrical work must be removed as a result of the alterations, it shall be completely removed, back to the first outlet which is left unaffected by the revision. All conduit, wire, supports, hangers, etc., are included under this requirement. Conduit which is buried in concrete or otherwise inaccessible positioned may be abandoned. In such cases, all wire shall be pulled out of conduit and conduit itself plugged at each end.

B. Remove or reroute all electrical feeders, risers, branch circuits, and other wiring as required by the alterations or as shown. Circuits serving loads which must remain, shall be rerouted as required, and reconnected to those loads.

C. Remove, relocate, and extend existing installations to accommodate new construction.

D. Remove abandoned wiring to source of supply.

E. Remove abandoned conduit/wiring, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

F. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.

G. Disconnect and remove abandoned panelboards and distribution equipment.

H. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

I. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.

J. Repair adjacent construction and finishes damaged during demolition and extension work.

K. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.

L. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

3.05 CLEANING AND REPAIR

A. See Section 017419 - Construction Waste Management and Disposal for additional requirements.

B. Clean and repair existing materials and equipment that remain or that are to be reused.

C. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

D. Luminaires: Remove existing luminaires for cleaning. Use mild detergent to clean all exterior and interior surfaces; rinse with clean water and wipe dry. Replace lamps, ballasts and broken electrical parts.

END OF SECTION

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single conductor building wire.
B. Wire and cable for 600 volts and less.
C. Wiring connectors.
D. Electrical tape.
E. Heat shrink tubing.
F. Wire pulling lubricant.
G. Cable ties.

1.02 RELATED REQUIREMENTS

A. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013 (Reapproved 2018).
B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011 (Reapproved 2017).
C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010, with Editorial Revision (2020).
D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2020).
E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2017.
F. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes; 2020.
G. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
H. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2021.
I. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems; 2021.
J. NFPA 70 - National Electrical Code: Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
K. IAC 180 - Illinois Administrative Code 180
L. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.
M. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.
N. UL 267 - Outline of Investigation for Wire-Pulling Compounds; Current Edition, Including All Revisions.
O. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.
P. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.
Q. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.

R. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
   3. Notify Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. Submit under provisions as described within the general requirements section.
B. Product Data: Provide for each cable assembly type.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70
B. Conform to Illinois Administrative Code 180 and all building codes as listed in IAC section 180.60
C. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
D. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Engineer and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
C. Nonmetallic-sheathed cable is not permitted.
D. Underground feeder and branch-circuit cable is not permitted.
E. Service entrance cable is not permitted.
F. Armored cable is not permitted.

1. Where not otherwise restricted, may be used:
    a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
        1) Maximum Length: 6 feet.
2. In addition to other applicable restrictions, may not be used:
    a. Where not approved for use by the authority having jurisdiction.
    b. Where exposed to damage.
    c. For damp, wet, or corrosive locations.

G. Metal-clad cable is not permitted.

2.02 CONDUCTOR AND CABLE MANUFACTURERS

A. Southwire Co.
B. Triangle Wire and Cable.

2.03 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.
B. Provide products listed, classified, and labeled as suitable for the purpose intended.
C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
D. Comply with NEMA WC 70.
E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
G. Conductor Material:
    1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
    2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
    3. Tinned Copper Conductors: Comply with ASTM B33.
H. Minimum Conductor Size:
    1. Branch Circuits: 12 AWG.
        a. Exceptions:
            1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
            2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.
            3) 20 A, 277 V circuits longer than 150 feet: 10 AWG, for voltage drop.
I. Conductor Color Coding:
    1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
    2. Color Coding Method: Integrally colored insulation.
    3. Color Code:
        a. 480Y/277 V, 3 Phase, 4 Wire System:
            1) Phase A: Brown.
            2) Phase B: Orange.
            3) Phase C: Yellow.

4) Neutral/Grounded: Gray.

b. 208Y/120 V, 3 Phase, 4 Wire System:

1) Phase A: Black.

2) Phase B: Red.

3) Phase C: Blue.

4) Neutral/Grounded: White.

c. Equipment Ground, All Systems: Green.

d. Isolated Ground, All Systems: Green with yellow stripe.

e. Travelers for 3-Way and 4-Way Switching: Pink.

f. For modifications or additions to existing wiring systems, comply with existing color code when existing code complies with NFPA 70 and is approved by the authority having jurisdiction.

2.04 SINGLE CONDUCTOR BUILDING WIRE

A. Manufacturers:

1. Copper Building Wire:

a. Cerro Wire LLC: www.cerrowire.com/#sle.

b. Encore Wire Corporation: www.encorewire.com/#sle.

c. Southwire Company: www.southwire.com/#sle.

B. Description: Single conductor insulated wire.

C. Conductor Stranding:

1. Feeders and Branch Circuits:

a. Size 10 AWG and Smaller: Solid.

b. Size 8 AWG and Larger: Stranded.

D. Insulation Voltage Rating: 600 V.

E. Insulation:

1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.

a. Installed Exterior or Underground: Type XHHW-2.

F. Conductor: Copper.

G. Insulation Voltage Rating: 600 volts.

2.05 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Wiring Connectors for Splices and Taps:

1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.

2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.

C. Wiring Connectors for Terminations:

1. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.

D. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
E. Mechanical Connectors: Provide bolted type or set-screw type.
F. Compression Connectors: Provide circumferential type or hex type crimp configuration.

2.06 ACCESSORIES

A. Electrical Tape:
   1. Manufacturers:
      a. 3M: www.3m.com/#sle.
      b. Plymouth Rubber Europa: www.plymouthrubber.com/#sle.
   2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
   3. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil; suitable for continuous temperature environment up to 194 degrees F and short-term 266 degrees F overload service.
   4. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil; suitable for continuous temperature environment up to 176 degrees F.
   5. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil.
B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.
C. Wire Pulling Lubricant:
   1. Listed and labeled as complying with UL 267.
   2. Suitable for use with conductors/cables and associated insulation/jackets to be installed.
   3. Suitable for use at installation temperature.
D. Cable Ties: Material and tensile strength rating suitable for application.
E. Use mechanical compression for 6 AWG or larger or any connection made within any type of exterior junction box or device to include. Cover connector with insulating tape or heat shrinkable insulation equivalent to 150% conductor insulation.
F. Outdoor boxes (Including building mounted boxes used for outdoor devices) and undergroud connections of any type #12 to #6 AWG.
   1. Ideal Weatherproof wire connectors or equal.
      a. Silicon filled wire connectors designed to meet UL 486D standards
      b. Size per manufacturer for number and wire sizes

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that interior of building has been protected from weather.
B. Verify that work likely to damage wire and cable has been completed.
C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
D. Verify that raceway installation is complete and supported.

E. Verify that field measurements are as indicated.
F. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

A. Circuiting Requirements:
   1. Unless dimensioned, circuit routing indicated is diagrammatic.
   2. When circuit destination is indicated without specific routing, determine exact routing required.
   3. Arrange circuiting to minimize splices.
   4. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
   5. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
   6. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is not permitted.
   7. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.
   8. Provide oversized neutral/grounded conductors where indicated and as specified below.
      a. Provide 200 percent rated neutral for feeders fed from K-rated transformers.
      b. Provide 200 percent rated neutral for feeders serving panelboards with 200 percent rated neutral bus.
B. Install products in accordance with manufacturer's instructions.
C. Perform work in accordance with NECA 1 (general workmanship).
D. Installation in Raceway:
   1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
   2. Pull all conductors and cables together into raceway at same time.
   3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
   4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
E. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
F. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
   1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.
   2. Installation in Vertical Raceways: Provide supports where vertical rise exceeds permissible limits.
G. Install conductors with a minimum of 12 inches of slack at each outlet.

H. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

I. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

J. Make wiring connections using specified wiring connectors.
   1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
   2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
   3. Do not remove conductor strands to facilitate insertion into connector.
   4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
   5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
   6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

K. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
   1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
      a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
   2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
      a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
      b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.
   3. Wet Locations: Use heat shrink tubing.

L. Insulate ends of spare conductors using vinyl insulating electrical tape.

M. Color Code Legend: Provide identification label identifying color code for ungrounded conductors at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

N. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods as required.

O. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

P. Install wire and cable securely, in a neat and workmanlike manner, as specified in NECA 1.

Q. Route wire and cable as required to meet project conditions.
   1. Wire and cable routing indicated is approximate unless dimensioned.
   2. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.
   3. Include wire and cable of lengths required to install connected devices within 10 ft of location shown.

R. Use wiring methods indicated.

S. Pull all conductors into raceway at same time.

T. Use suitable wire pulling lubricant for building wire 4 AWG and larger.
U. Protect exposed cable from damage.
V. Neatly train and lace wiring inside boxes, equipment, and panelboards.
W. Clean conductor surfaces before installing lugs and connectors.
X. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
Y. Identify and color code wire and cable under provisions of Section 260553. Identify each conductor with its circuit number or other designation indicated.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.
B. Inspect and test in accordance with NETA ATS, except Section 4.
C. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.
D. Correct deficiencies and replace damaged or defective conductors and cables.
E. Perform inspections and tests listed in NETA STD ATS, Section 7.3.2.

END OF SECTION

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 GENERAL CONDITIONS

A. Equipment shall not be held in place by its own dead weight. Base anchor fasteners shall be provided in each case.
B. All cutting and patching of new and/or existing surfaces will be the responsibility of the Electrical Contractor. Surfaces will be restored to its original condition and will be to the satisfaction of the Owner and the Architect. All patching will be by tradesmen normally employed by each specialty and will be paid by the Electrical Contractor.
C. Contractor shall give the Architect complete information as to size of openings in floors, walls, etc., so that such openings may be provided as the building progresses.
D. If openings are omitted or incorrect through failure to follow above instructions, the Contractor shall engage the Contractor for general finishes construction to cut and patch at his own expense to the satisfaction of the Architect.

1.02 SECTION INCLUDES

A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.03 RELATED REQUIREMENTS

A. Section 260533.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.
B. Section 265100 - Interior Lighting: Additional support and attachment requirements for interior luminaires.
C. Section 265600 - Exterior Lighting: Additional support and attachment requirements for exterior luminaires.

1.04 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.
D. MFMA-4 - Metal Framing Standards Publication; 2004.
E. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2009.
F. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2006
G. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2010
H. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements; 2009.
I. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
J. NFPA 70 - National Electrical Code: Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
K. IAC 180 - Illinois Administrative Code 180

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70
B. Conform to Illinois Administrative Code 180 and all building codes as listed in IAC section 180.60

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
    1. Comply with the following. Where requirements differ, comply with most stringent.
        a. NFPA 70.
        b. Requirements of authorities having jurisdiction.
    2. Provide required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for complete installation of electrical work.
    3. Provide products listed, classified, and labeled as suitable for purpose intended, where applicable.
    4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
    5. Steel Components: Use corrosion-resistant materials suitable for environment where installed.
        a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
        b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
B. Conduit and Cable Supports: Straps and clamps suitable for conduit or cable to be supported.
    1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
    2. Conduit Clamps: Bolted type unless otherwise indicated.
C. Outlet Box Supports: Hangers and brackets suitable for boxes to be supported.
D. Metal Channel/Strut Framing Systems:
    1. Description: Factory-fabricated, continuous-slot, metal channel/strut and associated fittings, accessories, and hardware required for field assembly of supports.
    2. Comply with MFMA-4.
E. Hanger Rods: Threaded, zinc-plated steel unless otherwise indicated.
F. Anchors and Fasteners:
    1. Unless otherwise indicated and where not otherwise restricted, use anchor and fastener types indicated for specified applications.

2.02 MATERIALS

A. Expansive screw anchors, shields, or other fastening items containing lead or other material that might loosen or melt under fire conditions shall not be used. No items shall rest on or depend for support on suspended ceiling media (tiles, lath, plaster, splines, etc.).
B. Hangers, Supports, Anchors, and Fasteners - General: Corrosion-resistant materials of size and type adequate to carry the loads of equipment and conduit, including weight of wire in conduit.
C. Sleeves for conduits shall be mild steel tube, galvanized inside and outside, equal to rigid conduit.

D. Supports: Fabricated of structural steel or formed steel members; galvanized angles or channels supported with 3/8" threaded rods anchored to the building construction. Any necessary Unistrut and/or steel to span construction members will be furnished and installed.

E. Anchors and Fasteners:
   1. Do not use powder-actuated anchors, spring clips, or beam clamps.
   2. Concrete Structural Elements: Use precast inserts, expansion anchors, or preset inserts.
   3. Steel Structural Elements: Use beam clamps, steel spring clips, steel ramset fasteners, or welded fasteners.
   4. Concrete Surfaces: Use self-drilling anchors or expansion anchors.
   5. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts or hollow wall fasteners.
   6. Solid Masonry Walls: Use expansion anchors or preset inserts.
   7. Sheet Metal: Use sheet metal screws.
   8. Wood Elements: Use wood screws.

F. Formed Steel Channel:
   1. Product: Unistrut

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install hangers and supports in accordance with NECA 1.

C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

D. Unless specifically indicated or approved by Engineer, do not provide support from suspended ceiling support system or ceiling grid.

E. Unless specifically indicated or approved by Engineer, do not provide support from roof deck.

F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

G. Equipment Support and Attachment:
   1. Use metal, fabricated supports or supports assembled from metal channel/strut to support equipment as required.
   2. Use metal channel/strut secured to studs to support equipment surface mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
   3. Use metal channel/strut to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
   4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

H. Secure fasteners in accordance with manufacturer's recommended torque settings.

I. Remove temporary supports.

END OF SECTION

SECTION 260533.13 - CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).
B. Galvanized steel intermediate metal conduit (IMC).
C. PVC-coated galvanized steel rigid metal conduit (RMC).
D. Flexible metal conduit (FMC).
E. Liquidtight flexible metal conduit (LFMC).
F. Galvanized steel electrical metallic tubing (EMT).
G. Rigid polyvinyl chloride (PVC) conduit.
H. Conduit, fittings and conduit bodies.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Concrete encasement of conduits.
B. Section 260526 - Grounding and Bonding for Electrical Systems.
C. Section 260529 - Hangers and Supports for Electrical Systems.
D. Section 260553 - Identification for Electrical Systems.
E. Section 260535 - Surface Raceway
F. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2020.
B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S); 2020.
C. ANSI C80.5 - American National Standard for Electrical Rigid Metal Conduit -- Aluminum (ERMC-A); 2020.
D. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit; 2018.
E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
F. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2020.
G. NECA 102 - Standard for Installing Aluminum Rigid Metal Conduit; 2004.
H. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); 2017.
I. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
J. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Metal Conduit and Intermediate Metal Conduit; 2018.
K. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2020.
L. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2021.
M. NFPA 70 - National Electrical Code: Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
N. IAC 180 - Illinois Administrative Code 180
O. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.

P. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
Q. UL 360 - Liquid-Tight Flexible Metal Conduit; Current Edition, Including All Revisions.
R. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.
S. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
T. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.
U. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.
V. UL 1242 - Electrical Intermediate Metal Conduit-Steel; Current Edition, Including All Revisions.
W. UL 2419 - Outline of Investigation for Electrically Conductive Corrosion Resistant Compounds; Current Edition, Including All Revisions.

1.04 SYSTEM DESCRIPTION

A. All building wiring shall be routed in approved metallic raceway (conduit) unless otherwise specifically noted.
B. All conduit shall be routed concealed (above lay-in ceiling, within walls, below grade or slab, etc.) within all finished spaces unless otherwise noted.

1.05 SUBMITTALS

A. Submit under provisions as described within the general requirements section.
B. Product Data: Provide for metallic conduit, flexible metal conduit, liquidtight flexible metal conduit, metallic tubing, nonmetallic conduit, flexible nonmetallic conduit, nonmetallic tubing, fittings, and conduit bodies.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70
B. Conform to Illinois Administrative Code 180 and all building codes as listed in IAC section 180.60
C. Conform to Illinois Administrative Code 180 and all building codes as listed in IAC section 180.60
D. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and shown.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.
B. Accept conduit on site. Inspect for damage.
C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70, manufacturer's instructions, and product listing.
B. Unless otherwise indicated and where not otherwise restricted, use conduit types indicated for specified applications. Where more than one listed application applies, comply with most

restrictive requirements. Where conduit type for particular application is not specified, use galvanized steel rigid metal conduit.

C. Underground:
   1. Under Slab on Grade: Use galvanized steel rigid metal conduit.
   2. Exterior, Direct-Buried: Use galvanized steel rigid metal conduit.
   3. Exterior, Embedded Within Concrete: Use galvanized steel rigid metal conduit.
   4. Where rigid polyvinyl chloride (PVC) conduit is provided, transition to galvanized steel rigid metal conduit (RMC) where emerging from underground.
   5. Where rigid polyvinyl (PVC) conduit larger than 2-inch (53 mm) trade size is provided, use galvanized steel rigid metal conduit (RMC) elbows for bends.

D. Embedded Within Concrete:
   1. Within Slab on Grade (within structural slabs only where approved by Structural Engineer): Use galvanized steel rigid metal conduit.
   2. Within Slab Above Ground (within structural slabs only where approved by Structural Engineer): Use galvanized steel rigid metal conduit.
   3. Within Concrete Walls Above Ground: Use galvanized steel rigid metal conduit.

E. Concealed Within Masonry Walls: Use electrical metallic tubing (EMT).

F. Concealed Within Hollow Stud Walls: Use electrical metallic tubing (EMT).

G. Concealed Above Accessible Ceilings: Use electrical metallic tubing (EMT).

H. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit (RMC), galvanized steel electrical metallic tubing (EMT), or stainless steel electrical metallic tubing (EMT).

I. Exposed, Interior, Not Subject to Physical Damage: Use electrical metallic tubing (EMT).

J. Exposed, Interior, Subject to Physical Damage: Use intermediate metal conduit (IMC).

K. Exposed, Exterior: Use galvanized steel rigid metal conduit.

L. Corrosive Locations Above Ground: Use PVC-coated galvanized steel rigid metal conduit.
   1. Corrosive locations include, but are not limited to:
      a. Cooling towers.
      b. Swimming pools and associated equipment areas.
      c. Chemical storage areas.

M. Flexible Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit (FMC).
   1. Maximum Length: 6 feet.

N. Flexible Connections to Vibrating Equipment:
   1. Dry Locations: Use flexible metal conduit (FMC).
   2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit (LFMC).
   3. Maximum Length: 6 feet unless otherwise indicated.
   4. Vibrating equipment includes, but is not limited to:
      a. Transformers.
      b. Motors.
      c. Generators

O. Fished in Existing Walls, Where Necessary: Use flexible metal conduit (FMC).

2.02 CONDUIT - GENERAL REQUIREMENTS

A. Existing Work: Where existing conduits are indicated to be reused, they may be reused only where they comply with specified requirements, are free from corrosion, and integrity is verified by pulling mandrel through them.
B. Provide conduit, fittings, supports, and accessories required for complete raceway system.
C. Provide products listed, classified, and labeled as suitable for purpose intended.
D. Minimum Conduit Size, Unless Otherwise Indicated:
    1. Branch Circuits: 1/2-inch trade size.
    2. Branch Circuit Homeruns: 3/4-inch trade size.
    3. Flexible Connections to Luminaires: 3/8-inch trade size.
E. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
B. Fittings:
    1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6.
    2. Material: Use malleable iron.
    3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.04 GALVANIZED STEEL INTERMEDIATE METAL CONDUIT (IMC)

A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
B. Fittings:
    1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 1242.
    2. Material: Use steel.
    3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.05 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Manufacturers:
    1. Robroy Industries: www.robroy.com.
B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.
C. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil, 0.040 inch.
D. PVC-Coated Boxes and Fittings:
    1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
    2. Nonhazardous Locations: Use boxes and fittings listed and labeled as complying with UL 514A, UL 514B, or UL 6.
    3. Material: Use steel or malleable iron.
    4. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil, 0.040 inch.

E. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil, 0.015 inch.

2.06 FLEXIBLE METAL CONDUIT (FMC)

A. Manufacturers as described above.
B. Description: NFPA 70, Type FMC standard-wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems.
C. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel.
D. Description: Interlocked steel construction.
E. Fittings: NEMA FB 1.

2.07 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Manufacturers as described above.
B. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
C. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use malleable iron.
D. Description: Interlocked steel construction with PVC jacket.
E. Fittings: NEMA FB 1.

2.08 GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT)

A. Manufacturers as described above.
B. Description: NFPA 70, Type EMT galvanized steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
C. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use compression/gland type.
      a. Do not use indenter type connectors and couplings.
D. Description: ANSI C80.3; galvanized tubing.
E. Fittings and Conduit Bodies: NEMA FB 1; steel compression type. Steel set screw type shall be used for conduit runs withing block walls.
F. Use True Color conduit to identify systems other than normal power systems for accessible conduits (above lay-in ceiling or otherwise visable).

2.09 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

A. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 80 unless otherwise indicated; rated for use with conductors rated 90 degrees C.
B. Fittings:

1. Manufacturer: Same as manufacturer of conduit to be connected.
2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.10 ACCESSORIES

A. Conduit Joint Compound: Corrosion-resistant, electrically conductive compound listed as complying with UL 2419; suitable for use with conduit to be installed.
B. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
C. Pull Strings: Use nylon tape with average breaking strength of not less than 1,250 lbf.
D. Sealing Compound for Hazardous/Classified Location Sealing Fittings: Listed for use with particular fittings to be installed.
E. Sealing Systems for Concrete Penetrations:
   1. Sleeves: Provide water stop ring or cement coating that bonds to concrete to prevent water infiltration.
   2. Rate for minimum of 40 psig; suitable for sealing around conduits to be installed.
F. Sealing Systems for Roof Penetrations: Premanufactured components and accessories as required to preserve integrity of roofing system and maintain roof warranty; suitable for conduits and roofing system to be installed; designed to accommodate existing penetrations where applicable.
G. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.
H. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.
I. Duct Bank Spacers: Nonmetallic; designed for maintaining conduit/duct spacing for concrete encasement in open trench installation; suitable for conduit/duct arrangement to be installed.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.
B. Verify that mounting surfaces are ready to receive conduits.
C. Verify that conditions are satisfactory for installation prior to starting work.
D. Verify routing and termination locations of conduit prior to rough-in.
E. Conduit routing is shown on drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.
B. Install conduit in accordance with NECA 1.
C. Galvanized Steel Rigid Metal Conduit (RMC): Install in accordance with NECA 101.
D. Aluminum Rigid Metal Conduit (RMC): Install in accordance with NECA 102.
E. Intermediate Metal Conduit (IMC): Install in accordance with NECA 101.
F. PVC-Coated Galvanized Steel Rigid Metal Conduit (RMC): Install using only tools approved by manufacturer.

G. Rigid Polyvinyl Chloride (PVC) Conduit: Install in accordance with NECA 111.
H. Liquidtight Flexible Nonmetallic Conduit (LFNC): Install in accordance with NECA 111.
I. Conduit Routing:
    1. Unless dimensioned, conduit routing indicated is diagrammatic.
    2. When conduit destination is indicated without specific routing, determine exact routing required.
    3. Conceal conduits unless specifically indicated to be exposed.
    4. Conduits in the following areas may be exposed, unless otherwise indicated:
        a. Electrical rooms.
        b. Mechanical equipment rooms.
        c. Within joists in areas with no ceiling.
    5. Unless otherwise approved, do not route exposed conduits:
        a. Across floors.
        b. Across roofs.
        c. Across top of parapet walls.
        d. Across building exterior surfaces.
    6. Conduits installed underground or embedded in concrete may be routed in shortest possible manner unless otherwise indicated. Route other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
    7. Arrange conduit to maintain adequate headroom, clearances, and access.
    8. Arrange conduit to provide no more than equivalent of three 90-degree bends between pull points.
    9. Arrange conduit to provide no more than 150 feet between pull points.
    10. Route conduits above water and drain piping where possible.
    11. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
    12. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
    13. Maintain minimum clearance of 12 inches between conduits and hot surfaces. This includes, but is not limited to:
        a. Heaters.
        b. Hot water piping.
        c. Flues.
    14. Group parallel conduits in same area on common rack.
J. Conduit Support:
    1. Secure and support conduits in accordance with NFPA 70 using suitable supports and methods approved by authorities having jurisdiction; see Section 260529.
    2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
    3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
    4. Use conduit strap to support single surface-mounted conduit.
        a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
    5. Use metal channel/strut with accessory conduit clamps to support multiple parallel surface-mounted conduits.

6. Use conduit clamp to support single conduit from beam clamp or threaded rod.
7. Use trapeze hangers assembled from threaded rods and metal channel/strut with accessory conduit clamps to support multiple parallel suspended conduits.
8. Use nonpenetrating rooftop supports to support conduits routed across rooftops, where approved.
9. Use of spring steel conduit clips for support of conduits is not permitted.
10. Use of wire for support of conduits is not permitted.
11. Where conduit support intervals specified in NFPA 70 and NECA standards differ, comply with most stringent requirements.

K. Connections and Terminations:
1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
3. Use suitable adapters where required to transition from one type of conduit to another.
4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
6. Where spare conduits stub up through concrete floors and are not terminated in box or enclosure, provide threaded couplings equipped with threaded plugs set flush with finished floor.
7. Provide insulating bushings, insulated throats, or listed metal fittings with smooth, rounded edges at conduit terminations to protect conductors.
8. Secure joints and connections to provide mechanical strength and electrical continuity.

L. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
2. Make penetrations perpendicular to surfaces unless otherwise indicated.
3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
4. Conceal bends for conduit risers emerging above ground.
5. Provide suitable sealing system where conduits penetrate exterior wall below grade.
6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty.
8. Provide metal escutcheon plates for conduit penetrations exposed to public view.
9. Install firestopping to preserve fire resistance rating of partitions and other elements; see Section 078400.

M. Underground Installation:
1. Minimum Cover, Unless Otherwise Indicated or Required:
   a. Underground, Exterior: 24 inches.
   b. Under Slab on Grade: 12 inches to bottom of slab.

2. Provide underground warning tape along entire conduit length for service entrance where not concrete-encased; see Section 260553.

N. Embedment Within Structural Concrete Slabs (only where approved by Structural Engineer):
   1. Maximum Conduit Size: 1-inch trade size unless otherwise approved.
   2. Install conduits within middle one third of slab thickness.
   3. Secure conduits to prevent floating or movement during pouring of concrete.

O. Concrete Encasement: Where conduits not otherwise embedded within concrete are indicated to be concrete-encased, provide minimum concrete cover of 3 inches on all sides unless otherwise indicated; see Section 033000.

P. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
   1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
   2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
   3. Where conduits are subject to earth movement by settlement or frost.

Q. Conduit Sealing:
   1. Use foam conduit sealant to prevent entry of moisture and gases. This includes, but is not limited to:
      a. Where conduits enter building from outside.
      b. Where service conduits enter building from underground distribution system.
      c. Where conduits enter building from underground.
      d. Where conduits may transport moisture to contact live parts.
   2. Where conduits cross barriers between areas of potential substantial temperature differential, use foam conduit sealant at accessible point near penetration to prevent condensation. This includes, but is not limited to:
      a. Where conduits pass from outdoors into conditioned interior spaces.
      b. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

R. Provide pull string in each empty conduit and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.

S. Provide grounding and bonding; see Section 260526.

T. Identify conduits; see Section 260553.

3.03 FIELD QUALITY CONTROL

A. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

B. Where coating of PVC-coated galvanized steel rigid metal conduit (RMC) contains cuts or abrasions, repair in accordance with manufacturer's instructions.

C. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING

A. Clean interior of conduits to remove moisture and foreign matter.

3.05 PROTECTION

A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.
B. Install conduit in accordance with NECA Standard of Installation.
C. Install steel conduit as specified in NECA 101.
D. Conduit fill shall not exceed 20% unless specifically noted on drawings.
E. Threads on steel conduit shall be given a coat of zinc dust in oil (T&B Kopr-Shield), or other approved compound. All joints shall be properly tightened and shall be watertight and insure a low resistance ground path in the conduit system.
F. Install nonmetallic conduit in accordance with manufacturer's instructions.
G. Arrange supports to prevent misalignment during wiring installation.
H. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
I. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.
J. Fasten conduit supports to building structure and surfaces under provisions of Section 260529.
K. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.
L. Do not attach conduit to ceiling support wires. In no case shall conduit runs rest on suspended or suspension members of the acoustical ceiling construction.
M. Arrange conduit to maintain headroom and present neat appearance.
N. Route exposed conduit parallel and perpendicular to walls.
O. Route conduit installed above accessible ceilings parallel and perpendicular to walls.
P. Route conduit in and under slab from point-to-point.
Q. Do not cross conduits in slab.
R. Maintain adequate clearance between conduit and piping.
S. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F.
T. Cut conduit square using saw or pipecutter; de-burr cut ends.
U. Bring conduit to shoulder of fittings; fasten securely.
V. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
W. Use conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations.
X. Install no more than equivalent of three 90 degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one shot bender to fabricate bends in metal conduit larger than 2 inch size. Should a greater number of bends be necessary, pull boxes shall be installed. Location of pull boxes must be approved by the Architect. Pull box covers shall be maded accessible. Where pull boxes occur above suspended plaster ceilings, provide access panels of type and size as required and as hereinsafter specified.
Y. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
Z. Provide suitable fittings to accommodate expansion and deflection where conduit crosses seismic.
AA. Provide suitable pull string in each empty conduit except sleeves and nipples.

BB. Use suitable caps to protect installed conduit against entrance of dirt and moisture.

CC. Ground and bond conduit under provisions of Section 260526.

DD. Identify conduit under provisions of Section 260553.

EE. Where conduits terminate in panel boxes, distribution panels, switchboards, pull boxes or starter boxes, provide fiber bushing and lock nuts. Bushings shall be O-Z/Gedney Type "A" up to 2" conduit, and Type "B" over 2", or equal, Appleton or Thomas & Betts. Bushings made of thermoplastic or other flammable material are NOT acceptable.

FF. Where conduits terminate in pull and outlet boxes, provide approved tinned iron bushings and secure to boxes with lock nuts and screw type bushings.

GG. All conduit which enters the building through the floor or foundation walls shall enter through a hot dipped galvanized cast iron conduit entrance assembly. The shell of this fitting shall be installed in the foundation wall before the concrete is poured. Entrance seals shall be as manufactured by O-Z/Gedney Company, Type "FSK" for floors, "WSK" for walls or approved equal.

HH. All conduit entering the building below grade and terminating into panels or pull boxes will provide seals around all conductors at box entry with O-Z/Gedney Type CSBI sealing bushing.

II. Install expansion-deflection fittings in all raceways at the expansion joints of the building in such a manner that the expansion joints of the building will be required in all directions. Install on all straight conduit runs in excess of 100 feet. Movement will be required in a straight line direction only. Use O-Z/Gedney type AX expansion fittings and DX expansion-deflection fittings. Maintain grounding continuity at each expansion fitting with a bonding jumper.

JJ. Final connections to all motors shall be made with flexible steel conduit. Final connections to roof exhaust fans shall be made with "Sealtite" waterproof flexible conduit. Provide additional ground wire to assure a perfect ground connection.

KK. No conduit will be routed on the roof. Where mechanical rooftop units are to be wired, conduit will be routed through, within the roof curb or routed with piping in mechanical roof curbs.

LL. All conduit ends, as installed, shall be plugged with cork, wood or brass plugs to prevent entrance of moisture, plaster, etc., and shall be blown and swabbed before wires are pulled in.

MM. Outlets or plates shall finish flush against exposed brick, tile, concrete or plaster walls and partitions. Unused outlets shall receive approved blank covers.

3.06 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preseerve fire resistance rating of partitions and other elements, using materials and methods specified within applicable sections of building specification.

B. Route conduit through roof openings for piping and ductwork wherever possible. Where separate roofing penetration is required, coordinate location and installation method with roofing installation..

END OF SECTION

SECTION 260533.16 - BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.
B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.

1.02 RELATED REQUIREMENTS

A. Section 260529 - Hangers and Supports for Electrical Systems.
B. Section 260533.13 - Conduit for Electrical Systems:
   1. Conduit bodies and other fittings.
   2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.
C. Section 262726 - Wiring Devices:
   1. Wall plates.
   2. Additional requirements for locating boxes for wiring devices.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.
C. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
D. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
E. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013 (Reaffirmed 2020).
F. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports; 2013 (Reaffirmed 2020).
G. NFPA 70 - National Electrical Code: Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
H. IAC 180 - Illinois Administrative Code 180
I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
K. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.
L. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
   2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.

3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
6. Coordinate the work with other trades to preserve insulation integrity.
7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
8. Notify Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. Submit under provisions as described within the general requirements section.
B. Product Data: Provide manufacturer's standard catalog pages and data sheets for outlet and device boxes, cabinets and enclosures, and floor boxes.
C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
D. Project Record Documents: Record actual locations for underground handhole enclosures, underground handhole enclosures, underground handhole enclosures, underground handhole enclosures, and underground handhole enclosures.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70
B. Conform to Illinois Administrative Code 180 and all building codes as listed in IAC section 180.60

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 BOXES

A. General Requirements:
1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
3. Provide products listed, classified, and labeled as suitable for the purpose intended.
4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.

2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
3. Use cast iron boxes or cast aluminum boxes where exposed galvanized steel rigid metal conduit or exposed intermediate metal conduit (IMC) is used.
4. Use cast aluminum boxes where aluminum rigid metal conduit is used.
5. Use suitable concrete type boxes where flush-mounted in concrete.
6. Use suitable masonry type boxes where flush-mounted in masonry walls.
7. Use raised covers suitable for the type of wall construction and device configuration where required.
8. Use shallow boxes where required by the type of wall construction.
9. Do not use "through-wall" boxes designed for access from both sides of wall.
10. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
11. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
12. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
13. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
14. Wall Plates: Comply with Section 262726.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
1. Comply with NEMA EN 10250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
2. NEMA EN 10250 Environment Type, Unless Otherwise Indicated:
a. Indoor Clean, Dry Locations: Type 1, painted steel.
b. Outdoor Locations: Type 3R, painted steel.
3. Junction and Pull Boxes Larger Than 100 cubic inches:
a. Provide screw-cover enclosures unless otherwise indicated.

2.02 GENERAL

A. In general, boxes shall be galvanized, pressed steel, have depth and shape best suited to the intended use, and contain knockouts of quantity and size equal to the conduit runs to be connected thereto. All boxes shall be securely fastened in place and shall provide sufficient support to the purpose intended.
B. Outlet boxes for mounting fixtures shall be equipped with slip-in or boltless fixture studs. Hickey studs will NOT be acceptable. Installation of the larger fixtures shall be made with hangers to support fixtures independently of outlet box.
C. Outlet boxes not mounting fixtures and at which no connections are made shall be equipped with steel cover plates. Although no connections are made in such outlets, sufficient wire shall be provided in each for making future connection.
D. Ceiling outlet boxes shall be galvanized, octagon, 4" x 1-1/2" deep without fixture stud, 2-1/8" deep with fixture stud.
E. Concrete boxes where used shall have a minimum of 1" concrete cover.
F. Exterior outlet boxes shall be weather-resistant (rain tight), having appropriate covers fitted with gaskets and fastened with screws. Boxes shall be Crouse-Hinds series CPS or Series V., as applicable.

G. Switch outlet boxes for local light control switches, convenience outlets, telephone, etc., shall be galvanized, square 4" x 1-1/2", with raised cover to fit flush with finish wall line. Multiple gang switch outlets shall consist of the required gang with raised covers. Where outlet boxes occur in exposed concrete block walls, boxes shall be installed in block cavity with a raised square edge tile cover of sufficient depth to extend out to face of block. Outlet boxes for special purposes shall be suitable for the purpose intended as herein specified and shown on the drawings.

H. See drawings for additional information. The above is the minimum specification unless otherwise noted on the drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive boxes.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide separate boxes for emergency power and normal power systems.

E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.

F. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.

G. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.

H. Box Locations:

1. Locate boxes as required for devices installed under other sections or by others.
    a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 262726.
2. Locate boxes so that wall plates do not span different building finishes.
3. Locate boxes so that wall plates do not cross masonry joints.
4. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
5. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
6. Acoustic-Rated Walls: Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches horizontal separation.
7. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
    a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.

b. Do not install flush-mounted boxes with area larger than 16 square inches or such that the total aggregate area of openings exceeds 100 square inches for any 100 square feet of wall area.

8. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 260533.13.
9. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:
   a. Concealed above accessible suspended ceilings.
   b. Within joists in areas with no ceiling.
   c. Electrical rooms.
   d. Mechanical equipment rooms.

I. Box Supports:
   1. Secure and support boxes in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
   2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
   3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.

J. Install boxes plumb and level.

K. Flush-Mounted Boxes:
   1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
   2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
   3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.

L. Install boxes as required to preserve insulation integrity.

M. Metallic Floor Boxes: Install box level at the proper elevation to be flush with finished floor.

N. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

O. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.

P. Close unused box openings.

Q. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

R. Provide grounding and bonding in accordance with Section 260526.

S. Electrical boxes are shown on Drawings in approximate locations.
   1. Adjust box locations up to 10 feet if required to accommodate intended purpose.

3.03 CLEANING

A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.04 PROTECTION

A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

SECTION 260533.23 - SURFACE RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface metal raceways (W/M 700)
B. Surface nonmetal raceways. (W/M 5400)

1.02 RELATED REQUIREMENTS

A. Section 260526 - Grounding and Bonding for Electrical Systems.
B. Section 260529 - Hangers and Supports for Electrical Systems.
C. Section 271005 - Structured Cabling for Voice and Data

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
B. NFPA 70 - National Electrical Code: Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
C. IAC 180 - Illinois Administrative Code 180

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets including dimensions, knockout sizes and locations, materials, fabrication details, finishes, service condition requirements, and accessories.
B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70
B. Conform to Illinois Administrative Code 180 and all building codes as listed in IAC section 180.60

1.06 PROJECT CONDITIONS

A. Where it is impossible to conceal conduit or where specifically called for on the drawings furnish and install surface raceway. surface raceway will be continuous from wall to wall or from wall to equipment. Raceway will be run at wall at ceilings and all drops will be at corners, no drops will be run in the center of walls. Route at base, door or building trim to best fit into building lines.

PART 2 PRODUCTS

2.01 RACEWAY REQUIREMENTS

A. Provide all components, fittings, supports, and accessories required for a complete raceway system.
B. Provide products listed, classified, and labeled as suitable for the purpose intended.
C. Do not use raceways for applications other than as permitted by NFPA 70 and product listing.

2.02 MANUFACTURERS

A. The Wiremold Company.

2.03 SURFACE METALLIC RACEWAY COMPONENTS

A. Surface Metallic Raceways:
   1. Acceptable product: Wiremold System.
      a. W/M 700 - Unless otherwise noted or required
         1) Finish: Ivory polyester topcoat over ivory primer, capable of being field-painted.
B. Fittings:
   1. Factory-formed units to complete indicated configuration of raceway systems, including, but not limited to, the following:
      a. External corner units.
      b. Internal corner units.
      c. Flat units.
      d. Blank end units.
      e. Elbows.
      f. Couplings: One per raceway joint location.
      g. Wire clips: One for every 2 linear feet of indicated raceway configuration.
      h. Replacement longitudinal barrier: One section for every 8 linear feet of indicated raceway configuration.
   2. Material: Same material and metal thickness as linear raceway components.
   3. Finish: Matching linear raceway components.
C. Device Brackets and Plates:
   1. Factory-formed brackets and plates allowing installation of indicated power, data, and communications devices, both single-gang and two-gang, either vertically or horizontally in raceways.
   2. Finish: Color matching linear raceway components.
D. Cover Brackets and Face Plates:
   1. Plastic device mounting brackets and trim plates allowing installation of indicated power, data, and communications devices horizontally in raceways; trim cover sized to overlap device cut-out in raceway, concealing seams.
   2. Finish: Color matching linear raceway components.
E. Communications Devices and Accessories:
   1. Communications devices: See SECTION 271005 for complete requirements.
F. Electrical devices, and wiring for electrical devices, are specified in Section 16140.
G. Fasteners: Types specified in manufacturer's installation instructions for project conditions.

2.04 SURFACE NONMETALLIC RACEWAY SYSTEM

A. Acceptable Product: Wiremold 5400 System - White
B. Product Description: Two-piece system of rigid polyvinyl chloride (PVC) extrusions, 8 feet in length with nominal 0.095 inch wall thickness, total 5-1/4 inches high by 1-3/4 inches deep, consisting of the following:

1. Base: Wiremold 5400TB, two wiring channels separated by one integral barrier, each channel large enough to accept standard power and communication devices without restricting capacity of the adjacent channel.
2. Cover: Wiremold 5400C, spanning entire width of base concealing all the wiring channels, flanged for snapping onto base side walls and center barrier.

C. Fittings: Supply factory-formed fittings specified in manufacturer's product data for indicated configurations and service requirements, and as follows:
1. Cover clip for each vertical joint between cover unit sections.
2. One wire clip for every 2 linear feet of indicated base configuration.
3. One section of replacement divider fitting for every 8 linear feet of indicated base configuration.

D. ACCESSORIES
1. Device Brackets and Plates:
a. Factory-formed brackets and plates allowing installation of indicated power, data, and communications devices, both single-gang and two-gang, either vertically or horizontally in raceways.
b. Color: White.
2. Communications Devices and Accessories:
a. Communications devices: See SECTION 271005 for complete requirements.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.
B. Perform work in accordance with NECA 1 (general workmanship).
C. Install raceways plumb and level.
D. Secure and support raceways in accordance with Section 260529 at intervals complying with NFPA 70 and manufacturer's requirements.
E. Use suitable insulating bushings and inserts at connections to outlets and corner fittings.
F. Close unused raceway openings.
G. Provide grounding and bonding in accordance with Section 260526.

END OF SECTION

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Identification for Equipment
   1. Panelboards
   2. Panelboard Schedules
   3. Existing Panelboard Schedules
   4. Identification for Raceways - Color coded Raceway
   5. Identification for Boxes
      a. Color Coded Boxes
      b. Field Painted Junction Boxes - Fire Alarm System
      c. Circuits
   6. Identification Nameplates
   7. Identification labels

1.02 RELATED REQUIREMENTS

A. Section 260534 - Conduit: Color coding for conduit to identify systems other than normal power systems for accessible conduits.
B. Section 283100 - Fire Alarm and Detection System

1.03 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code: Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
B. NFPA 70E - Standard for Electrical Safety in the Workplace; 2024.
C. IAC 180 - Illinois Administrative Code 180

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.
B. Sequencing:
   1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
   2. Do not install identification products until final surface finishes and painting are complete.

1.05 SUBMITTALS

A. Submit under provisions as described within the general requirements section.
B. Product Data: Provide catalog data for nameplates, labels, and markers.
C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation and installation of product.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70

B. Conform to Illinois Administrative Code 180 and all building codes as listed in IAC section 180.60

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

A. Identification for Equipment:
   1. Use identification nameplate or identification label to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
      a. Panelboards:
         1) Use identification nameplate to identify panelboard name.
         2) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
         3) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.

B. Identification for Raceways:
   1. Use True Color conduit to identify systems other than normal power systems for accessible conduits (above lay-in ceiling or otherwise visable)
      a. Color Code:
         1) Fire Alarm System: Red.
         2) Low Voltage System: Blue

C. Identification for Boxes:
   1. Use color coded boxes to identify systems other than normal power system.
      a. Color-Coded Boxes: Color per the same color code used for raceways.
   2. Fire alarm junction box covers shall be painted red. See fire alarm specification for additional instructions.
   3. Use identification labels to identify circuits enclosed.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:
   1. Materials:
      a. Indoor Clean, Dry Locations: Use plastic nameplates.
      b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
   2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
   3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
   4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
   5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.

B. Identification Labels:

1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:
1. Minimum Size: 1 inch by 2.5 inches.
2. Legend:
a. System designation where applicable:
1) Emergency Power System: Identify with text "EMERGENCY".
2) Fire Alarm System: Identify with text "FIRE ALARM".
b. Equipment designation or other approved description.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height:
a. System Designation: 1 inch.
b. Equipment Designation: 1/2 inch.
5. Color:
a. Normal Power System: White text on black background.

PART 3 EXECUTION

3.01 PREPARATION

A. Clean surfaces to receive adhesive products according to manufacturer's instructions.
B. Degrease and clean surfaces to receive nameplates and labels.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.
B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
1. Surface-Mounted Equipment: Enclosure front.
2. Flush-Mounted Equipment: Inside of equipment door.
3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
4. Branch Devices: Adjacent to device.
5. Interior Components: Legible from the point of access.
6. Boxes: Inside surface of cover
7. Conductors and Cables: Legible from the point of access.
C. Install identification products centered, level, and parallel with lines of item being identified.
D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
F. Mark all handwritten text, where permitted, to be neat and legible.

3.03 FIELD QUALITY CONTROL

A. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

B. Panel identification

1. Provide identification for each lighting and appliance panelboard with a computer generated directory accurately indicating rooms and/or equipment being serviced, sealed in plastic and attached to door interior, etc. Note: Each index shall be sequenced in accord with actual panel circuiting (i.e. left side - 1, 3, 5, 7, etc., right side - 2, 4, 6, etc.).
2. Existing panelboards that require circuit modifications and/or additions shall have their circuit schedule completely replaced. All existing to remain circuits shall be traced to their load as required and indicated on the circuit schedule.

END OF SECTION

SECTION 260583 - WIRING CONNECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical connections to equipment.

1.02 RELATED REQUIREMENTS

A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables.
B. Section 260533.13 - Conduit for Electrical Systems.
C. Section 260533.16 - Boxes for Electrical Systems.
D. Section 262726 - Wiring Devices.
E. Section 262816.16 - Enclosed Switches.

1.03 REFERENCE STANDARDS

A. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2020).
B. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2021.
C. NFPA 70 - National Electrical Code: Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
D. IAC 180 - Illinois Administrative Code 180.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
   2. Determine connection locations and requirements.
B. Sequencing:
   1. Install rough-in of electrical connections before installation of equipment is required.
   2. Make electrical connections before required start-up of equipment.

1.05 SUBMITTALS

A. Submit under provisions as described within the general requirements section.
B. Product Data: Provide wiring device manufacturer’s catalog information showing dimensions, configurations, and construction.
C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70
B. Conform to Illinois Administrative Code 180 and all building codes as listed in IAC section 180.60.
C. Products: Listed, classified, and labeled as suitable for the purpose intended.

1.07 COORDINATION

A. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
B. Determine connection locations and requirements.
C. Sequence rough-in of electrical connections to coordinate with installation of equipment.
D. Sequence electrical connections to coordinate with start-up of equipment.

PART 2 PRODUCTS

2.01 MATERIALS

A. Disconnect Switches: As specified in Section 262816.16 and in individual equipment sections.
B. Wiring Devices: As specified in Section 262726.
C. Flexible Conduit: As specified in Section 260533.13.
D. Wire and Cable: As specified in Section 260519.
E. Boxes: As specified in Section 260533.16.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.02 ELECTRICAL CONNECTIONS

A. Make electrical connections in accordance with equipment manufacturer's instructions.
B. Final connections to all motors shall be made with flexible steel conduit. Final connections to roof exhaust fans shall be made with "Sealtite" waterproof flexible conduit. Provide additional ground wire to assure a perfect ground connection.
C. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
D. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
E. Provide receptacle outlet to accommodate connection with attachment plug.
F. Provide cord and cap where field-supplied attachment plug is required.
G. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
H. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
I. Install terminal block jumpers to complete equipment wiring requirements.
J. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.
K. Coolers and Freezers: Cut and seal conduit openings in freezer and cooler walls, floor, and ceilings.
L. Seal roof penetrations as recommended by roofing manufacturer.

END OF SECTION

SECTION 262726 - WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall switches.
B. Receptacles.
C. Wall plates.

1.02 RELATED REQUIREMENTS

A. Section 260533.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

A. FS W-C-596 - Connector, Electrical, Power, General Specification for; 2014h, with Amendments (2017).
B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification); 2014g, with Amendment (2017).
C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
D. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.
E. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2020).
F. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2021.
G. NFPA 70 - National Electrical Code: Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
H. IAC 180 - Illinois Administrative Code 180
I. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.
J. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.
K. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.
L. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.
M. UL 1310 - Class 2 Power Units; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. Submit under provisions as described within the general requirements section.
B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70
B. Conform to Illinois Administrative Code 180 and all building codes as listed in IAC section 180.60
C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 WIRING DEVICE APPLICATIONS

A. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.
B. Provide GFCI protection for receptacles installed within 6 feet of sinks.
C. Provide GFCI protection for receptacles installed in kitchens.
D. Provide GFCI protection for receptacles serving electric drinking fountains.

2.02 ALL WIRING DEVICES

A. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
B. Finishes:
    1. Wiring Devices Installed in Finished Spaces: White with stainless steel wall plate unless otherwise indicated.
    2. Wiring Devices Installed in Unfinished Spaces: White with galvanized steel wall plate unless otherwise indicated.
    3. Wiring Devices Installed in Wet or Damp Locations: White with specified weatherproof cover unless otherwise indicated.

2.03 WALL SWITCHES

A. Manufacturers:
    1. Hubbell Incorporated: www.hubbell.com/#sle.
    2. Leviton Manufacturing Company, Inc: www.leviton.com.
    3. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us
B. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20and where applicable FS W-S-896; types as indicated on the drawings.
    1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
C. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.
    1. Single pole
        a. Hubbell HBL1221
        b. Leviton 1221 - 2
        c. Pass and Seymour PS20AC1I
    2. Two pole
        a. Hubbell HBL 1222
        b. Leviton 1222-2
        c. Pass and Seymour PS20AC2I
    3. Three way
        a. Hubbell 1223
        b. Levition 1223-2
        c. Pass and Seymour PS20AC3I

D. Pilot Light Wall Switches: Industrial specification grade, 20 A, 120/277 V with red illuminated standard toggle type switch actuator and maintained contacts; illuminated with load on; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

E. Locking Wall Switches: Industrial specification grade, 20 A, 120/277 V with lever type keyed switch actuator and maintained contacts; switches keyed alike; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

2.04 INTERIOR RECEPTACLES

A. Manufacturers:
   1. Hubbell Incorporated: www.hubbell.com/#sle.
   2. Leviton Manufacturing Company, Inc: www.leviton.com.
   3. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us

B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498and where applicable FS W-C-596; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
   2. NEMA configurations specified are according to NEMA WD 6.

C. Convenience Receptacles:
   1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
      a. Hubbell HBL 5362
      b. Leviton 5362
      c. Pass and Seymour 5362A

D. GFCI Receptacles:
   1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
   2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
      a. Hubbell GFR5352A
      b. Levition 7899
      c. Pass and Seymour 2094
   3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations.

E. USB Charging Devices:
   1. USB Charging Devices - General Requirements: Listed as complying with UL 1310.
      a. Charging Capacity - Two-Port Devices: 2.1 A, minimum.
   2. USB Charging/Tamper Resistant Receptacle Combination Devices: Two-port (Type A) USB charging device and receptacle, commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; rectangular decorator style.

2.05 WALL PLATES

A. Wall Plates: Comply with UL 514D.

1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
2. Size: Standard.
3. Screws: Metal with slotted heads finished to match wall plate finish.

B. Stainless Steel Wall Plates: Brushed satin finish, Type 302 spec grade stainless steel.
C. Galvanized Steel Wall Plates: Rounded corners and edges, with corrosion resistant screws.
D. Weatherproof Covers for Damp Locations: Gasketed, cast aluminum, with self-closing hinged cover and corrosion-resistant screws; listed as suitable for use in wet locations with cover closed.
E. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.
F. Plates shall be held in place with screws finished to match the plates.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.
B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
D. Verify that final surface finishes are complete, including painting.
E. Verify that floor boxes are adjusted properly.
F. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
G. Verify that openings in access floor are in proper locations.
H. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.
B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
B. Perform work in a neat and workmanlike manner in accordance with NECA 1, including mounting heights specified in that standard unless otherwise indicated.
C. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of wiring devices provided under this section.
    1. Mounting Heights: Unless otherwise indicated, as follows:
        a. Wall Switches: 48 inches above finished floor.
        b. Receptacles: 18 inches above finished floor or 6 inches above counter.
    2. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.
D. Install wiring devices in accordance with manufacturer's instructions.

E. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
F. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.
G. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
H. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
I. For isolated ground receptacles, connect wiring device grounding terminal only to identified branch circuit isolated equipment grounding conductor. Do not connect grounding terminal to outlet box or normal branch circuit equipment grounding conductor.
J. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
K. Install in accordance with NECA "Standard of Installation."
L. Install wiring devices plumb and level with mounting yoke held rigidly in place.
M. Install wall switches with OFF position down.
N. Do not share neutral conductor on branch circuits utilizing wall dimmers.
O. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
P. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.
Q. Install receptacles horizontal with grounding pole on right hand side.
R. Connect wiring device grounding terminal to outlet box with bonding jumper.
S. Connect wiring devices by wrapping conductor around screw terminal.
T. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets in unfinished spaces.

3.04 INTERFACE WITH OTHER PRODUCTS

A. Coordinate locations of outlet boxes provided under Section 260537 to obtain mounting heights specified.

3.05 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.
B. Inspect each wiring device for damage and defects.
C. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.
D. Operate each wall switch with circuit energized and verify proper operation.
E. Verify that each receptacle device is energized.
F. Test each receptacle to verify operation and proper polarity.
G. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
H. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.06 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

3.07 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION

SECTION 262816.16 - ENCLOSED SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Enclosed safety switches.
B. Thermal Disconnects
C. Elevator disconnect switches

1.02 RELATED REQUIREMENTS

A. Section 260526 - Grounding and Bonding for Electrical Systems.
B. Section 260529 - Hangers and Supports for Electrical Systems.
C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
D. Section 260573 - Power System Studies: Additional criteria for the selection of equipment and associated protective devices specified in this section.
E. Section 262813 - Fuses.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
B. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.
C. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2008 (Reaffirmed 2020).
D. NEMA BS 31047 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); 2013 (Reaffirmed 2023).
E. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems; 2021.
F. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
G. IAC 180 - Illinois Administrative Code 180.
H. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
I. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
J. UL 98 - Enclosed and Dead-Front Switches; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
    1. Coordinate the work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and within working clearances for electrical equipment required by NFPA 70.
    2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
    3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.

4. Notify Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. Submit under provisions as described within the general requirements section.
B. Product Data: Provide manufacturer's standard catalog pages and data sheets for enclosed switches and other installed components and accessories.
C. Project Record Documents: Record actual locations of enclosed switches.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70
B. Conform to Illinois Administrative Code 180 and all building codes as listed in IAC section 180.60.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to enclosed switch internal components, enclosure, and finish.

1.08 FIELD CONDITIONS

A. Maintain ambient temperature between -22 degrees F and 104 degrees F during and after installation of enclosed switches.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Siemens.
B. Schneider Electric; Square D Products: www.schneider-electric.us.
C. Cutler-Hammer
D. Bussmann (Elevator Disconnect)
E. Equipment manufacturer shall match that of sections 262413, 262416, 262419, 262813, 262913.

2.02 ENCLOSED SAFETY SWITCHES

A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy duty; ratings, configurations, and features as indicated on the drawings.
B. Provide products listed, classified, and labeled as suitable for the purpose intended.
C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
   1. Altitude: Less than 6,600 feet.
   2. Ambient Temperature: Between -22 degrees F and 104 degrees F.
D. Horsepower Rating: Suitable for connected load.
E. Voltage Rating: Suitable for circuit voltage.
F. Short Circuit Current Rating:

1. Provide enclosed safety switches, when protected by the fuses or supply side overcurrent protective devices to be installed, with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 260573.
2. Minimum Ratings:
    a. Switches Protected by Class H Fuses: 10,000 rms symmetrical amperes.
    b. Heavy Duty Single Throw Switches Protected by Class R, Class J, Class L, or Class T Fuses: 200,000 rms symmetrical amperes.

G. Provide with switch blade contact position that is visible when the cover is open.

H. Conductor Terminations: Suitable for use with the conductors to be installed.

I. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.

J. Enclosures: Comply with NEMA EN 10250, and list and label as complying with UL 50 and UL 50E.
1. Environment Type per NEMA EN 10250: Unless otherwise indicated, as specified for the following installation locations:
    a. Indoor Clean, Dry Locations: Type 1.
    b. Outdoor Locations: Type 3R.
2. Finish for Painted Steel Enclosures: Manufacturer's standard, factory applied grey unless otherwise indicated.

K. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.

L. Heavy Duty Switches:
1. Comply with NEMA BS 31047.
2. Conductor Terminations:
    a. Provide mechanical lugs unless otherwise indicated.
    b. Lug Material: Copper suitable for terminating copper conductors only.
3. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.

2.03 **THERMAL DISCONNECTS:**

A. Description: NEMA ICS 2, Class A manually-operated motor controllers with overload relay(s).

B. Configuration: Non-reversing unless otherwise indicated.

C. Fractional-Horsepower Manual Motor Starters:
1. Furnish with toggle operator.
2. Overload Relays: Bimetallic or melting alloy thermal type.
3. Provide means for locking operator in the OFF position.
4. Furnish Red ON indicating light where not within sight of equipment.

2.04 ELEVATOR DISCONNECT

A. Elevator disconnect shall be Bussmann Power Module Switch - PS (no substitutes)

B. Provide Power Module Switch in a single NEMA enclosure with all necessary relay(s), control transformer and other options (as listed below), and as shown on drawings. The Power Module Switch shall be constructed, listed, and certified to the standards as listed in above. The Power Module Switch shall have an ampere rating as shown on the Contract Drawings, and shall

include a horsepower rated fusible switch with shunt trip capabilities. The ampere rating of the switch shall be based upon elevator manufacturer requirements and utilize Class J Fuses (provided separately).

C. The switch shall include as an accessory, a 100VA control power transformer with primary and secondary fuses. The voltage rating shall be the same as the elevator (coordinate with drawings) with a 120volt secondary. It shall also contain an isolation relay (3PDT, 10 amp, 120V). The coil of the isolation relay shall be 120VAC. A normally open dry contact shall be provided by the fire alarm safety system to energize the isolation relay and activate the shunt trip solenoid.

D. The module shall contain the following options:
   1. Key to Test Switch
   2. "ON" Pilot light - Red
   3. Isolated full capacity neutral lug
   4. 1P NC Mechanically interlocked auxiliary contact
   5. Fire alarm voltage monitoring relay

E. Fuse shall be Bussmann Low-Peak Class J. Final fuse size shall be the responsibility of the installing contractor. Coordinate with elevator equipment manufacturer and provide as required.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.
B. Verify that the ratings of the enclosed switches are consistent with the indicated requirements.
C. Verify that mounting surfaces are ready to receive enclosed safety switches.
D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.
B. Perform work in accordance with NECA 1 (general workmanship).
C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
D. Provide required support and attachment in accordance with Section 260529.
E. Install enclosed switches plumb.
F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.
G. Provide grounding and bonding in accordance with Section 260526.
H. Provide fuses complying with Section 262813 for fusible switches as indicated or as required by equipment manufacturer's recommendations.
I. Provide identification nameplate for each enclosed switch in accordance with Section 260553.
J. Provide arc flash warning labels in accordance with NFPA 70.
K. Install fuses in fusible disconnect switches.
L. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.
B. Inspect and test in accordance with NETA ATS, except Section 4.
C. Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.
D. Correct deficiencies and replace damaged or defective enclosed safety switches or associated components.

3.04 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.05 CLEANING

A. Clean dirt and debris from switch enclosures and components according to manufacturer's instructions.
B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 265100 - INTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior luminaires.
B. Emergency lighting units.
C. Exit signs.
D. Ballasts and drivers.
E. Lamps.
F. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 260529 - Hangers and Supports for Electrical Systems.
B. Section 260533.16 - Boxes for Electrical Systems.
C. Section 262726 - Wiring Devices: Manual wall switches and wall dimmers.

1.03 REFERENCE STANDARDS

A. ANSI C78.379 - American National Standard for Electric Lamps -- Reflector Lamps -- Classification of Beam Patterns; 2006.
B. ANSI C82.4 - American National Standard for Lamp Ballasts - Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps; 2017.
C. IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products; 2019.
D. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources; 2021.
E. NECA/IESNA 500 - Standard for Installing Indoor Lighting Systems; 2006.
F. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.
G. NEMA WD 6 - Wiring Devices - Dimensional Requirements; National Electrical Manufacturers Association; 2002 (R2008).
H. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
I. IAC 180 - Illinois Administrative Code 180.
J. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
K. UL 1598 - Luminaires; Current Edition, Including All Revisions.
L. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
    1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.

2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
3. Notify Engineer of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

A. Submit under provisions as described within the general requirements section.
B. Shop Drawings:
   1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
   2. Provide photometric calculations where luminaires are proposed for substitution upon request.
C. Shop Drawings: Indicate dimensions and components for each fixture that is not a standard product of the manufacturer.
D. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
   1. LED Luminaires:
      a. Include estimated useful life, calculated based on IES LM-80 test data.
E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
F. Operation and Maintenance Data: Instructions for each product including information on replacement parts.
G. Project Record Documents: Record actual connections and locations of luminaires and any associated remote components.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70
B. Conform to Illinois Administrative Code 180 and all building codes as listed in IAC section 180.60.
C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 DELIVERY, STORAGE, AND PROTECTION

A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.
B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.08 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

A. Furnish products as indicated in luminaire schedule included on the drawings.

2.02 LUMINAIRES

A. Provide products that comply with requirements of NFPA 70.
B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
C. Provide products listed, classified, and labeled as suitable for the purpose intended.
D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
G. LED Luminaires:
    1. Components: UL 8750 recognized or listed as applicable.
    2. Tested in accordance with IES LM-79 and IES LM-80.
    3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

2.03 LUMINAIRE ACCESSORIES

A. Luminaire disconnects
    1. Ideal PowerPlug or equal
        a. Meets CEC and NEC code changes for non-residential fluorescent luminaires with ballasts
        b. Perfect for OEM or retrofit lighting applications
        c. Patented push-in technology quickly locks wires in place
        d. Passes UL 2459 & CSA 182.3 finger probe requirements
        e. Fits through 1/2 in. knockout
        f. Pieces pull apart safely and easily
        g. 3/8 in. strip length indicator
        h. Thumb ridges provide superior grip
        i. Ideal two or three wire standard version

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.
B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
C. Verify that suitable support frames are installed where required.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.
B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of luminaires provided under this section.
B. Install products in accordance with manufacturer's instructions.
C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).
D. Provide required support and attachment in accordance with Section 260529.
E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
F. Suspended Ceiling Mounted Luminaires (lay-in, surface or pendant):
    1. Do not use ceiling tiles to bear weight of luminaires.
    2. Secure surface-mounted and recessed luminaires to ceiling support channels or framing members or to building structure.
    3. Secure pendant-mounted luminaires to building structure.
    4. Secure lay-in luminaires to ceiling support channels using UL (E61165 and UL 912Y) approved earthquake clips at four corners.
    5. In addition to ceiling support wires, provide two galvanized steel safety wire(s), minimum 12 gauge, connected from opposing corners of each recessed luminaire to building structure.
G. Recessed Luminaires:
    1. Install trims tight to mounting surface with no visible light leakage.
    2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.
    3. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.
H. Suspended Luminaires:
    1. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
    2. Provide minimum of two supports for each luminaire equal to or exceeding 4 feet nominal length, with no more than 4 feet between supports.
    3. Install canopies tight to mounting surface.
I. All light fixtures shall include Power Plug style disconnects installed on the line side of all fixtures and fixture ballasts. Follow all manufacturer's installation instructions.
J. It will be this Contractor's responsibility to verify all ceiling types with the Architectural drawings and specifications to assure the correct mounting details.
K. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.
L. Install recessed luminaires to permit removal from below.

M. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.
N. Install wall mounted luminaires, emergency lighting units, and exit signs at height as indicated on Drawings.
O. Install accessories furnished with each luminaire.
P. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within fixture; use flexible conduit.
Q. Connect luminaires and exit signs to branch circuit outlets provided under Section 260537 using flexible conduit.
R. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
S. Bond products and metal accessories to branch circuit equipment grounding conductor.
T. Install specified lamps in each emergency lighting unit, exit sign, and luminaire.
U. All gymnasium fixtures (including exit signs and emergency battery lighting) shall have heavy duty wireguards installed.
V. Remote Ballasts: Install in accessible location as indicated or as required to complete installation, using conductors per manufacturer's recommendations not exceeding manufacturer's recommended maximum conductor length to luminaire.
W. Install lamps in each luminaire.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.
B. Inspect each product for damage and defects.
C. Perform field inspection in accordance with Section 014000.
D. Operate each luminaire after installation and connection to verify proper operation.
E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Engineer.

3.05 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Engineer. Secure locking fittings in place.
B. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Engineer or authority having jurisdiction.
C. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Engineer or authority having jurisdiction.
D. Aim and adjust fixtures as indicated.
E. Position exit sign directional arrows as indicated.

3.06 CLEANING

A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.
B. Clean electrical parts to remove conductive and deleterious materials.
C. Remove dirt and debris from enclosures.
D. Clean photometric control surfaces as recommended by manufacturer.
E. Clean finishes and touch up damage.

3.07 CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate proper operation of luminaires to Engineer, and correct deficiencies or make adjustments as directed.
B. Just prior to Substantial Completion, replace all lamps that have failed.

END OF SECTION

SECTION 265600 - EXTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Exterior luminaires.
B. Poles and accessories.

1.02 RELATED REQUIREMENTS

A. Section 260529 - Hangers and Supports for Electrical Systems.
B. Section 260533.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

A. ANSI C78.379 - American National Standard for Electric Lamps -- Reflector Lamps -- Classification of Beam Patterns; 2006.
B. ANSI C82.1 - American National Standard Specifications for Fluorescent Lamp Ballasts; 2004.
C. ANSI C82.4 - American National Standard for Lamp Ballasts - Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps; 2017.
D. ANSI O5.1 - American National Standard for Wood Poles: Specifications and Dimensions; 2022.
E. IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products; 2019.
F. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources; 2021.
G. IES RP-8 - Recommended Practice: Lighting Roadway and Parking Facilities; 2021.
H. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
I. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems; 2000 (Reaffirmed 2006).
J. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
K. IAC 180 - Illinois Administrative Code 180.
L. UL 1598 - Luminaires; Current Edition, Including All Revisions.
M. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. Submit under provisions as described within the general requirements section.
B. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.
    1. LED Luminaires:

a. Include estimated useful life, calculated based on IES LM-80 test data.

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

E. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70

B. Conform to Illinois Administrative Code 180 and all building codes as listed in IAC section 180.60.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.

B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

C. Receive, handle, and store wood poles in accordance with ANSI O5.1.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

A. Furnish products as indicated in luminaire schedule included on the drawings.

2.02 LUMINAIRES

A. Provide products that comply with requirements of NFPA 70.

B. Provide products that are listed and labeled as complying with UL 1598, where applicable.

C. Provide products listed, classified, and labeled as suitable for the purpose intended.

D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.

F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

G. LED Luminaires:

1. Components: UL 8750 recognized or listed as applicable.
2. Tested in accordance with IES LM-79 and IES LM-80.
3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

PART 3 EXECUTION

3.01 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.
B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.02 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of luminaires provided under this section.
B. Install products in accordance with manufacturer's instructions.
C. Install luminaires in accordance with NECA/IESNA 501.
D. Provide required support and attachment in accordance with Section 260529.
E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
F. Recessed Luminaires:
    1. Install trims tight to mounting surface with no visible light leakage.
    2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.
    3. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.
G. Suspended Luminaires:
    1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
    2. Provide minimum of two supports for each luminaire equal to or exceeding 4 feet in length, with no more than 4 feet between supports.
    3. Install canopies tight to mounting surface.
H. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
I. Pole-Mounted Luminaires:
    1. Foundation-Mounted Poles:
        a. Install foundations plumb.
        b. Install poles plumb, using leveling nuts as required to adjust to plumb.
        c. Tighten anchor bolt nuts to manufacturer's recommended torque.
        d. Install non-shrink grout between pole anchor base and concrete foundation, leaving small channel for condensation drainage.
        e. Install anchor base covers or anchor bolt covers as indicated.
    2. Grounding:
        a. Bond luminaires, metal accessories, metal poles, and foundation reinforcement to branch circuit equipment grounding conductor.
    3. Install separate service conductors, 12 AWG copper, from each luminaire down to handhole for connection to branch circuit conductors.
J. Install accessories furnished with each luminaire.
K. Bond products and metal accessories to branch circuit equipment grounding conductor.
L. Provide concrete bases for lighting poles at locations indicated in accordance with appropriate building specification.
M. Existing building surface mounted exterior fixtures

1. Counduit feeding fixtures shall not be routed on the building exterior (unless specifically noted on the drawings).
2. Conduit feeding fixtures shall be routed within the inside of the building. Where available, the conduit shall be routed above lay-in ceilings. Verify fixture mounting height.
3. Where necessary, provide surface mouted raceway (inside the building). See specification section elsewhere.

N. Bond luminaires, metal accessories, and metal poles to branch circuit equipment grounding conductor. Provide supplementary grounding electrode at each pole.

O. Light poles shall be installed a minimum of 10'-0" from utility company overhead facilities or as directed by utility company. If drawings show pole locations in conflict with this requirement, this Contractor shall be responsibile for pointing out conflict and request guidance before pole base installation. If these instructions are not specifically followed, this Contractor shall relocate pole base, conduit, pole, fixtures, etc. as required at no additional cost.

3.03 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for additional requirements.
B. Inspect each product for damage and defects.
C. Perform field inspection, testing, and adjusting.
D. Operate each luminaire after installation and connection to verify proper operation.
E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Engineer.

3.04 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Engineer. Secure locking fittings in place.
B. Aim and adjust luminaires to provide illumination levels and distribution indicated on Drawings.

3.05 CLEANING

A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.
B. Clean electrical parts to remove conductive and deleterious materials.
C. Remove dirt and debris from enclosure.
D. Clean photometric control surfaces as recommended by manufacturer.
E. Clean finishes and touch up damage.

3.06 CLOSEOUT ACTIVITIES

3.07 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

3.08 SCHEDULE - SEE DRAWINGS

END OF SECTION

SECTION 265730 - LIGHTING CONTROL - HUBBELL NX

PART 1 GENERAL

1.01 SUMMARY

A. Installed system shall be comprised of stand-alone and networked control devices as indicated. System control devices shall include, but are not limited to:
   1. Digital Room Controllers
   2. UL924 Load Controller
   3. Fixture Control Modules
   4. Lighting Control Panels
   5. Sensors
   6. Wall Stations
   7. Network Area Controller
   8. Controlled Receptacles
   9. Network Modules
   10. Network Accessories
   11. Software Interfaces
   12. Conductors and Cabling

1.02 SYSTEM DESCRIPTION

A. The contractor shall provide and install NX Lighting Controls System as shown on plans and specified herein. NX Lighting Controls System shall be designed and configured to send and receive control, monitoring, operating and maintenance signals and commands wired and or wirelessly to and from networked enabled room controllers, fixture modules, switch stations, occupancy and daylight sensors, lighting control panels and other controls devices.

1.03 SUBMITTALS

A. Prior to fabrication and shipment of lighting control components, manufacturer shall provide submittal documentation for approval.
B. Submittal documentation shall include:
   1. Bill of Material including a list of components to be supplied,
   2. Device specification sheets indicating device features, certifications, dimensions, construction specifications, electrical specifications, wiring diagrams, nomenclature, and related products,
   3. Component schedules: Indicating lighting control device types and locations
   4. Lighting panel schedules,
   5. Wiring diagrams,
   6. Control cable type and routing requirements,
   7. System riser drawings of sufficient detail to indicate relative placement of major system components and the required connections between each,
   8. Contractor Startup Request Form – to be completed prior to factory startup,
   9. Operating and maintenance instructions, manuals and/or videos.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualification: Manufacturer of lighting control devices with minimum five years record of satisfactory manufacturing and support of components comparable to basis of design system.
   1. Approval of Comparable Products: Submit the following at least 10 days prior to submission of a proposal package. Substitution submitted without the below shall be rejected.
      a. Submit line-by-line comparison that describes differences, if any, between each lighting control device specified and those being proposed. Comparison shall include differences in size, quantity, quality, method of control, features and functions, control software functions, and installation requirements.
      b. Product data, including certified independent test data indicating compliance with requirements.
      c. Samples of each component.
      d. Project references: Minimum of 3 installations not less than 3 years old, with Owner and Architect contact information.
      e. Sample warranty.
   2. Substitutions following award of contract are not allowed except as stipulated in Division 01 General Requirements.

B. Factory Assembly: All system components shall arrive at the job site completely pre-wired and ready for installation, requiring only the connection of lighting circuits and network terminations. All connections shall be made to clearly and permanently labeled termination points or by connectorized cable. Systems that required field assembly shall not be acceptable.

C. Component Testing: All system components and assemblies shall be individually tested prior to assembly. Once assembled, all finished products shall be tested for proper operation of all control functions per specifications prior to shipment.

1.05 SYSTEM COMPLIANCE

A. Compliance: Where indicated, individual components shall comply with the following requirements:
   1. NEC Compliance: All system components shall comply with all applicable sections of the National Electrical Code (NEC) NFPA 70 as required.
   2. NEMA Compliance: All system components shall comply with all applicable portions of NEMA standards pertaining to types of electrical equipment and enclosures.
   3. UL Approval: All applicable equipment shall be tested to and listed under UL standard 508, UL standard 916 or UL924 and shall bare labels to indicate compliance. Lighting control relays shall be tested to UL standard 508 for both safety and endurance. Systems listed under ETL or other UL sections shall provide documentation proving compliance with UL standards as listed above.
   4. FCC Emissions: All applicable equipment shall comply with FCC emissions standards specified in Part 15, sub-part j for commercial and residential applications and shall bear labels indicating compliance testing. Equipment that does not meet these standards shall not be acceptable.

1.06 WARRANTY

A. Manufacturer shall warrant the lighting control system components to be free from defects in material and workmanship for a period of five (5) years from the date of the certificate of

building occupancy or proof of installation, whichever occurs first ("Warranty Period"). If the certificate of building occupancy is not available or there is no proof of installation, the Warranty Period shall begin with the Product ship date.

B. Manufacturer's warranty shall include the repair or replacement product(s) with the same or a functionally equivalent product(s) or component part(s).

C. Manufacturer shall provide telephone technical support and remote diagnostics where applicable during normal business hours excluding manufacturer holidays.

D. Upon request, Manufacturer shall provide quotation for manufacturer service contract option(s) which include on-site technician visits for service and repair.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers
   1. Hubbell NX
   2. Basis-of-Design: NX Lighting Controls System manufactured by HLI Solutions, a division of Current, Greenville SC.

2.02 SYSTEM ARCHITECTURE

A. System shall consist of wired and/or wireless, distributed intelligent lighting control devices consisting of but not limited to control modules with ON/OFF, full range dimming and CCT control capabilities, and system input devices including but not limited to occupancy/vacancy sensors, daylight sensors and manual switch stations.

B. System shall provide for automatic self-configuration of system devices. Self-configuration shall be accomplished by the devices themselves and provide for control of lighting prior to system custom configuration and programming. Systems that require configuration prior to use shall be considered unacceptable.

C. To implement lighting control strategies, the system architecture shall facilitate the association of system input devices to control modules. The system shall use the Area/Zone/Group assignment strategy. The system shall support up to 128 Areas. Each area shall consist of up to 128 Zones and each zone shall consist of up to 16 Groups. Each device may be programmed to participate in one Area and Zone however may belong to one or more of the available 16 Groups within a Zone.

D. System shall provide time-of-day and astronomical clock scheduling. Each Area/Zone shall support up to 99 scheduled events for use in developing time-of-day or astronomical clock sunrise/sunset automated schedules. Each schedule shall have the ability to turn a group ON or OFF or activate a preset lighting scene at a scheduled time. Schedules shall be day-of-week selectable and may be programmed to activate on any combination of days of the week (Sunday through Saturday) or to activate on a specific date/holiday.

E. System shall support blink alerts. Relay outputs within the control modules shall be programmable to blink prior to being turned OFF. Blink alert duration time shall be adjustable. Control modules programmed for the blink alert function shall blink the controlled lighting prior to turning OFF to warn occupants of the upcoming OFF event. If an ON command is received during the blink alert time, relay output will be overridden and left ON for the override time. Override time shall be adjustable.

F. System input devices shall be deployed in a space to monitor and broadcast changes such as occupancy, daylight levels and manual switch input.

G. System customization and programming shall be performed from a mobile App and/or web-based configuration and system management tools.

H. System shall have an intuitive and easy to use Graphical User Interface (GUI) to configure, control, monitor and schedule individual devices or groups of devices.

I. System shall remain fully functional during the programming process. Lighting control systems that must be taken "OFFLINE" for programming are not acceptable. All programming changes shall take effect immediately as they are programmed.

J. System shall be capable of being accessed from a local network or remotely using any standard Internet browser. System shall not require any special client-side software. Systems which utilize special client-side software shall not be acceptable.

K. Systems devices shall be capable of communication with each over one or all of the below methods.
   1. RS485 multidrop serial network
   2. Wireless mesh network
   3. Ethernet TCIP network

L. Wired – RS485/Ethernet
   1. System shall provide an Ethernet communication backbone (NX Network) for the connection of control Zones.
   2. System shall utilize the RS485 standard for connection of and communications between Zone Devices.
   3. System shall utilize the RS485 standard for connection of and communications between SmartPORT™ devices (e.g., Sensors, Switches and Accessories) connected within a NX Zone.

M. Wireless – Coordinator-less, Self-Organizing/Self-Healing Mesh
   1. System shall have a wireless architecture that utilizes wireless mesh radio technology to create a peer-to-peer, self-organizing and self-healing mesh network infrastructure.
   2. System shall have no single point of failure. A master controller/coordinator or master node shall not be required for proper system operation. All nodes shall be capable of communicating with each other without the need of these types of single point of failure devices. Systems which utilize a master controller/coordinator shall not be acceptable.
   3. System shall be self-organizing. The mesh network of devices shall self-organize automatically without the need to manually set device addresses via dials, DIP switches or other means.
   4. System shall be self-healing. System devices within the mesh network shall automatically reroute messages around a failed device to ensure message delivery.
   5. System architecture shall facilitate data transmission between wireless devices over the 2.4GHz ISM radio frequency (RF) band with a supported RF range of 100ft between wireless devices indoors and 300ft outdoors.
   6. System shall use a wireless mesh radio communication protocol to transmit/receive and negotiate messaging among wireless devices.
   7. System shall utilize spread spectrum frequency hopping to facilitate robust communication and prevent the unauthorized interception of messages over the air and to comply with FCC requirements.
   8. System shall provide the ability to secure messages. When implemented, each device shall use the strong and secure AES-128 (Advanced Encryption Standard) security cipher to encrypt and decrypt messages. System shall also use the secure HTTPS/SSL protocol when users access the system using their Internet browser.

N. System devices shall be capable of having their firmware updated or upgraded over the air through the wireless mesh network.

2.03 DIGITAL ROOM CONTROLLERS

A. NX Room Controllers
   1. Basis of Design Product: NX Lighting Controls System, NX Room Controllers.
   2. As indicated and where shown on the plans, install NXRC series Room Controller(s) to control the quantity of lighting and plug loads required.
   3. NX Room Controller(s) shall integrate the functionality of connected control components including wall switch stations, occupancy sensors and daylight sensors to provide the required sequence of operation for the space.
   4. NX Room Controller(s) and associated room control components shall operate in a totally standalone mode and not require the use of a network, software, computer, or server for local control functions.
   5. NX Room Controller(s) shall have an embedded Time Clock and be capable of storing and running up to 99 local schedules. Schedules shall run autonomously without the need of any coordinator, gateway, or master controller.
   6. Construction:
      a. NX Room Controller housing shall be constructed of GSM UL rated 94 HB plastic approved for use in a return air plenum.
      b. The housing and shall include an integral 1/2" chase nipple for external mounting to standard junction box knockout.
      c. Two RJ45 FX Port connectors shall be accessible on the side of the enclosure for expansion of a Zone Segment to allow for an expanded number of Zone Segment devices (e.g., Room Controllers, In-Fixture Modules, and Digital Sensors). Up to 32 controllers and devices can be daisy-chained together.
      d. Two RJ45 SmartPORT™ connectors shall be accessible on the side of the enclosure for the connection of NX room level devices.
      e. Two recessed push buttons and associated LED indicators shall be accessible on the top of the enclosure to provide override, status, setup, and testing functions.
   7. Electrical:
      a. NX Room Controller(s) shall have a single power feed and shall be capable of operation at voltages between 120/277/347 volts AC, 50/60 Hz.
      b. One or two output relays (model specific) shall provide for the following load types and ampacity (per relay):
         1) 20A, Tungsten,
         2) 20A, Magnetic Ballast,
         3) 16A, Electronic Ballast,
         4) 1 H.P. Motor @ 120V, ¾ H.P. @ 277V; ½ H.P. @ 347V
      c. Where indicated provide one or two independent 0-10 volt dimming channels (model specific) for full range dimming control of fixtures equipped with compatible dimmable ballast or driver.
      d. Each dimming output shall have a current sinking capacity of at least 30 mA.
      e. NX Room Controller(s) shall be capable of supplying 250 mA of Class 2 auxiliary DC power for use by wall switch stations, occupancy sensors, and daylight sensors connected to the room controller's two RJ45 SmartPORT connectors.

f. NX Room Controller(s) shall be equipped with power monitoring circuitry capable of measuring and reporting the total connected load for each room controller.

8. Functional:
   a. Provide an integral pushbutton and LED indicator for each load for status and to allow operation of the relays and dimmers for testing and verification without requiring other control devices to be connected.
   b. NX Room Controller(s) shall have a default operation providing an automatic logical sequence of operation for each load as the room control devices are plugged into the SmartPORT connectors.
   c. Default operation for occupancy sensors shall be automatic on, automatic off for all loads.
   d. Upon connection of a switch, the operation shall automatically change to manual on, automatic off (vacancy) mode for all loads.
   e. Provide capability to convert each load independently to automatic on or vacancy mode using only the integral push buttons and LED indicators on the room controller.
   f. When in vacancy mode, provide a 30 second grace period after an off during which automatic on shall be temporarily enabled.
   g. It shall be possible to connect up to thirty-two (32) room controllers together on the FX Ports using Cat5 patch cables to provide configurations up to 64 switched and dimmed loads operating as a single zone.
   h. Provide the following set up and configuration functions without the need for additional devices or software:
      1) Assign/reassign relays for control by wall switch station buttons,
      2) Configure relays for occupancy or vacancy operation,
      3) Assign/reassign dimmers to raise/lower switches,
      4) Assign dimming channels for response to daylight sensor control,
      5) Auto calibrate default daylight sensor sequence of operation,
      6) Save preset scenes.

9. NX Room Controller(s) shall support the following specialty modes:
   a. SpectraSync™ CCT Control
      1) Dimmer channels can be set individually to control CCT via 0-10V.
      2) Scheduling can be implemented to mimic the natural transition of light throughout the course of the day.
      3) Room-based solutions can be implemented to allow occupants to tune color to task.
   b. SpectraClean™
      1) Ability to control SpectraClean enabled fixtures with three different modes for varying applications:
         (a) Constant On
         (b) Scheduled
         (c) Programmed Dosage

2.04 UL924 LOAD CONTROLLER

A. NX UL924 Load Controller

1. Basis of Design Product: NX Lighting Controls System, NX UL924 Load Controller.
2. As indicated and where shown on the plans, install NX UL924 Load Controller to control the quantity of emergency lighting loads required.
3. NX UL924 Load Controller shall meet NFPA Article 700 requirements for emergency lighting.
4. NX UL924 Load Controller and associated room control components shall operate in a totally standalone mode and not require the use of a network, software, computer, or server for local control functions.
5. NX UL924 Load Controller shall provide a remote test button or fire alarm interface.
6. NX UL924 Load Controller shall have an embedded Time Clock and be capable of storing and running up to 99 local schedules. Schedules shall run autonomously without the need of any coordinator, gateway, or master controller.
7. Construction:
    a. NX UL924 Load Controller housing shall be constructed of GSM UL rated 94 HB plastic approved for use in a return air plenum.
    b. The housing and shall include an integral 1/2" chase nipple for external mounting to standard junction box knockout.
    c. Two RJ45 FX Port connectors shall be accessible on the side of the enclosure for expansion of a Zone Segment to allow for an expanded number of Zone Segment devices (e.g., Room Controllers, In-Fixture Modules, and Digital Sensors). Up to 32 controllers and devices can be daisy-chained together.
    d. Two recessed push buttons and associated LED indicators shall be accessible on the top of the enclosure to provide override, status, setup, and testing functions.
8. Electrical:
    a. NX UL924 Load Controller shall have a single power feed and shall be capable of operation at voltages between 120/277/347 volts AC, 50/60 Hz.
    b. One relay output shall provide the following load types and ampacity:
        1) 20A, Tungsten,
        2) 20A, Magnetic Ballast,
        3) 16A, Electronic Ballast,
        4) 1 H.P. Motor @ 120V, ¾ H.P. @ 277V; ½ H.P. @ 347V.
    c. NX UL924 Load Controller shall provide two independent 0-10 volt dimming channels for full range dimming control of fixtures equipped with compatible dimmable ballast or driver.
    d. Each dimming output shall have a current sinking capacity of at least 30 mA.
    e. NX UL924 Load Controller shall be equipped with power monitoring circuitry capable of measuring and reporting the total connected load for each room controller.
9. Functional:
    a. SmartPORT Functionality:
        1) NX UL924 Load Controller shall automatically recognize connected devices in the Zone Segment.
        2) NX UL924 Load Controller shall function as a standard room controller.
        3) NX UL924 Load Controller’s RJ45 CAT5 connection shall be used as a sensing line to standard room controller only and does not support NX room devices.
    b. Emergency Functionality:

1) NX UL924 Load Controller's RJ45 CAT5 connection shall be used as a sensing line to standard room controller on normal circuit.
2) Removal of 24VDC on CAT5 connection shall put NX UL924 Load Controller into emergency state.
3) NX UL924 Load Controller's default emergency state is ON with both dimming channels to 100%

c. Provide an integral pushbutton and LED indicator for controlled load for status and to allow operation of the relay and dimmers for testing and verification without requiring other control devices to be connected.

d. Provide the following set up and configuration functions without the need for additional devices or software:
1) Assign/reassign relays for control by wall switch station buttons,
2) Configure relays for occupancy or vacancy operation,
3) Assign/reassign dimmers to raise/lower switches,
4) Assign dimming channels for response to daylight sensor control,
5) Save preset scenes.

10. NX UL924 Load Controller shall support the following specialty modes:
a. SpectraSync™ CCT Control
1) Dimmer channels can be set individually to control CCT via 0-10V.
2) Scheduling can be implemented to mimic the natural transition of light throughout the course of the day.
3) Room-based solutions can be implemented to allow occupants to tune color to task.

b. SpectraClean™
1) Ability to control SpectraClean enabled fixtures with three different modes for varying applications:
(a) Constant On
(b) Scheduled
(c) Programmed Dosage

2.05 FIXTURE MODULES

A. NX In-Fixture Modules
1. Basis of Design Product: NX Lighting Controls System, NX In-Fixture Modules.
2. As indicated in the specifications and as shown on the plans, install NXFM series Fixture Control Module enabled fixture(s).
3. NX In-Fixture Modules shall be designed to install inside the fixture they control.
4. NX In-Fixture Modules shall consist of a completely distributed intelligent lighting controller capable of functioning completely independently including time based and astronomical scheduling of On/Off and preset events without the need of any coordinator, gateway or master controller. Sensors and switches as well as other NX In-Fixture enabled fixtures shall be capable of being connected directly to the NX In-Fixture Module to create a fully functional lighting control system.
5. NX In-Fixture Module shall be provided with one SPST relay. Relay shall be supplied with "Zero Cross Switching" control to limit the effects of inrush on the relay contacts.

6. NX In-Fixture Module shall be compatible with incandescent, magnetic, and electronic lighting loads including LED drivers. NX In-Fixture Module shall include zero arc point switching circuitry and have the following max load ratings:
7. Construction:
    a. Housing: GSM UL Rated 94 HB Plastic
    b. Mounting: Mounts inside fixture
8. Electrical:
    a. Line Voltage Versions:
        1) Input: Universal 120-347VAC, 50-60Hz
        2) Output: One or two relay outputs (model specific) shall provide for the following load types and ampacity (per relay):
            (a) 10A, 120VAC only Incandescent
            (b) 10A, 120-347VAC, Magnetic Ballast
            (c) 5A, 120-277VAC, Electronic Ballast
            (d) 3A, 347VAC, Electronic Ballast
        3) Surge Withstand: 2000V
        4) Peak Inrush: 160A for 2 ms Max
    b. Low Voltage Versions:
        1) Input: 12-24VDC
    c. NX In-Fixture Modules shall be provided with two 0-10VDC control interfaces for full range dimming control of dimming ballasts and LED drivers. Interface shall be designed to continuously sink 30mA of current.
    d. NX In-Fixture Module 0-10VDC control interfaces shall be configurable for 0-10VDC dimming, dim to off or color temperature control.
9. Functional:
    a. NX In-Fixture Modules shall be designed to self-configure, automatically to meet energy code requirements as NX sensors and other NX devices are connected.
    b. NX In-Fixture Module shall be designed such that self-configuration takes place automatically without user intervention or commissioning of any kind.
    c. NX In-Fixture Modules shall be rated and tested for an operating temperature range of -40° to 185°F [-40° to 85°C].
    d. NX In-Fixture Module shall be equipped with a Real Time Clock and integral backup for schedule information. Each module shall support up to 99 schedules. Schedules shall be loaded to the module via the network or locally using the NX Lighting Controls App. Once loaded, schedules shall run autonomously without the need of any coordinator, gateway, or master controller.
    e. NX In-Fixture Module shall be capable of having its device firmware updated wirelessly over the air when connected to a NX sensor of via the NX SmartPORT.
    f. NX In-Fixture Modules shall be supplied with one momentary pushbutton with LED for manual control and testing. Through the use of this switch, it shall be possible to test the On/Off and dimming functionality of the NX In-Fixture module or completely reset the NX In-Fixture Module to factory defaults without the need to connect any other device or testing equipment.
    g. NX In-Fixture Module shall include non-volatile memory for retaining device settings during power outages.

10. NX In-Fixture Module shall be UL Listed to UL916 and Certified to CAN/CSA C22.2 NO 205-M1983.
11. NX In-Fixture Module shall be FCC certified.

B. NX On-Fixture Modules
1. Basis of Design Product: NX Lighting Controls System, NX On-Fixture Module.
2. As indicated in the specifications and as shown on the plans, install NXOFM series wireless On-Fixture Control Module(s).
3. NX On-Fixture modules shall consist of a completely self-contained distributed intelligent wireless lighting controller capable of functioning completely independently including time based and astronomical scheduling of On/Off and preset events without the need of any coordinator, gateway or master controller.
4. NX On-Fixture Module shall be configurable remotely over the air utilizing built in Bluetooth radio an iOS or Android handheld device with the NX Lighting Controls App installed or via NX Wireless Network.
5. NX On-Fixture Module shall be capable of having its device firmware updated wirelessly over utilizing it's built in Bluetooth radio and iOS or Android handheld device with the NX Lighting Controls App installed or via NX Wireless Network.
6. On-Fixture Module shall respond to scheduled events, occupancy/vacancy sensor events and manual switch station events.
7. On-Fixture Module shall monitor and measure energy consumption.
8. On-Fixture Module shall include non-volatile memory for retaining device settings during power outages.
9. NX On-Fixture Modules shall be rated and tested for an operating temperature range of -40° to 185°F [-40° to 85°C].
10. NX On-Fixture Module shall include one SPST relay for On/Off control.
11. NX On-Fixture Modules relay shall be supplied with "Zero Cross Switching" control to limit the effects of inrush on the relay contact.
12. NX On-Fixture Module shall be compatible with incandescent, magnetic, and electronic lighting loads including LED drivers.
13. Construction:
    a. Housing: GSM UL Rated 94 HB Plastic
    b. Mounting: Standard C136-41 (2013) with 5 or 7 pin twist-lock connector. Compatible with C136-10 sockets.
14. Electrical:
    a. Input: 120-480VAC, 50-60Hz
    b. Output: Relay output shall provide for the following load types and ampacity:
        1) 5A@120-347VAC,
        2) 3A@480V
    c. Surge Withstand: 2000V
    d. Peak Inrush: 160A for 2 ms Max
    e. Standby Power (W):
        1) 120VAC: 1.2
        2) 277VAC: 1.5
        3) 347VAC: 1.5
        4) 480VAC: 1.3

15. Functional:
    a. On-Fixture Module shall include an integrated daylight sensor with a foot candle range as shown below:
        1) On level: 1FC to 5FC (Default: 5FC)
        2) Off level: 4FC to 15FC (Default: 8FC)
    b. NX On-Fixture Modules shall communicate with other NX enabled fixtures and devices via NX Wireless Network with the following characteristics:
        1) Robust & reliable IEEE 802.15.4 2.4GHz wireless self-organizing and self-healing mesh network
        2) Radio Range: Outdoor: ~1000 ft. (~300m) Note: Range based on clear line of site.
        3) Security: AES-128 (Advanced Encryption Standard)
16. NX On-Fixture Module shall include non-volatile memory for retaining device settings during power outages.
17. NX On-Fixture Module shall UL Listed to UL916 and Certified to CAN/CSA C22.2 NO 205-M1983.
18. NX On-Fixture Module shall be FCC certified.

2.06 LIGHTING CONTROL PANELS

A. NX Lighting Control Panels
    1. Basis of Design Product: NX Lighting Controls System, NX Lighting Control Panels.
    2. As indicated and where shown on the plans, install NX Lighting Control Panels V2 (NXP2 Series).
    3. Panel shall be a fully distributed intelligent lighting controller with the ability to function as a stand-alone lighting control panel or as part of an NX networked system.
    4. Panel shall provide standard capacities for 8, 16, 24, 32, or 48 relays in each panel with matching number of 0-10v dimming channels.
    5. Panel shall be available in custom configurations. Configuration options shall include: panel shipment type (enclosure/interior shipped together, enclosure/interior shipped separately, enclosure only, and interior only), panel size, number of single pole/double pole relays, emergency control option, input voltage and enclosure mount (surface mount or flush mount).
    6. Panels shall be factory assembled and tested. No field assembly shall be required.
    7. Construction:
        a. Panel shall be surface or flush wall mounted in a NEMA1 rated enclosure, based on panel configuration.
        b. Panel shall be capable of being shipped with enclosure/interior together, enclosure/interior separately, enclosure only, and interior only in appropriately designed packaging. When enclosure is shipped separately, enclosure shall enable rough-in of all electrical connections prior to receipt of the panel interior.
        c. Panel enclosure shall have standard electrical conduit knockouts on the top, the bottom and both sides of the enclosure to allow installation flexibility. Field drilling and cutting for pipe and wire shall not be required.
        d. Panel shall provide keyhole mounting holes in the rear of the enclosure
        e. Panel enclosure shall include 6” spacing running the width of the panel at the bottom of the panel to allow for line voltage accessories such as contactors or to provide a

"gutter". Space shall be separated from the low voltage area utilizing a removable metal barrier. No knockouts added to the bottom plate of the inner high voltage divider. Exterior enclosure will maintain knockouts on bottom.

f. Panel venting shall conform to NEMA 1 enclosure specifications to contain any local explosion and to protect the working environment.

g. Panel enclosure shall feature removable metal barriers that separate all high-voltage components and wiring (Class 1) from all low-voltage (Class 2) components and wiring.

h. Panel enclosure shall be of welded construction primed and painted with a powder coat finish. Unpainted or galvanized enclosures are not acceptable.

i. Panel cover shall attach to the enclosure with #10-32 x ½" truss head machine screws.

j. Panel cover shall employ "keyhole" style openings for the top two mounting screws to allow the panel's cover to be temporarily hung during installation eliminating the need to completely remove all the mounting screws along with contributing to safety ensuring the cover does not swing if all screws were removed.

1) 8 Relay panel cover – 4 mounting holes: 2 keyhole style slots, 2 slotted style slots

2) 16/32 Relay panel cover – 6 mounting holes: 2 keyhole style slots, 4 slotted style slots

3) 48 Relay panel cover – 8 mounting holes: 2 keyhole style slots, 6 slotted style slots

k. Panel cover shall be sized for either surface or recess mounting of the panel.

l. Panel cover shall have hinged locking door to expose only the low voltage wiring section of the panel.

m. Panel door hinges shall be located on the left side.

n. Panel shall be provided with a factory or field installable panel interior. Panel interior shall contain all controller electronics, power supplies, relays, and other required components. Panel shall arrive at the project site completely pre-wired and requiring only the connection of lighting circuits and network cable. Systems that require field assembly of controllers or chassis inserts are not acceptable

o. Panel interior components shall reside on a framed skeleton. When disconnected from the load circuits and necessary mounting connections, the framed skeleton can be removed taking all the electrical components intact.

p. Panel interior components shall be designed to not become dislodged during shipment.

q. Panel spacing between panel relays shall be suitable for separating any two relays in the panel to meet the NEC requirements for normal and emergency power when a metal divider is installed between relays. A metal plate barrier shall be available to separate relays - two plates per application.

r. Panel relays shall be of the snap-in type and be individually field replaceable.

8. Electrical:

a. Panel shall be supplied with either a 120V/277V, 347V or 480V power supply.

b. Panel power supply shall provide the required capacity for the operation of the panel, relays, controllers, NX Network, SmartPORTs, user interfaces and the maximum number of low voltage and/or data devices that can be connected to each panel.

c. Panel wire connections shall be made to labeled terminal blocks.

d. Panel shall have LED status/failure indicators.

e. Panel shall provide support for Bluetooth programming using the NX Lighting Controls App and the NX Bluetooth Radio Bridge with Clock or a SmartPORT connected NX sensor.
f. Panel shall include two (2) Ethernet ports for connection to the NX Network.
g. Panel shall include four (4) RJ45 NX SmartPORTs for the connection of all NX sensors and switches. SmartPORTs shall be capable of supplying 250 mA of Class 2 auxiliary DC power for use by wall switch stations, occupancy sensors, and daylight sensors connected to the SmartPORT connectors
h. Panel shall have four (4) 3-wire low voltage dry contact inputs. Removable terminal blocks shall be provided to support momentary or maintained closures from building automation systems, fire systems, demand response and security systems as well as other systems or devices including occupancy sensors, daylight sensors, and low voltage switches. Each input shall be individually programmable and provide the ability to initiate any NX switch compatible function or command. (on, off, raise, lower, preset, timed on/off). Each input will provide a connection for sourcing 24V, a common, control and pilot light functionality for low voltage switch stations.
i. Panel shall have two (2) SPDT (NO/NC) dry contact outputs, with removable terminal blocks, to provide a contact closure to signal out to another system that is capable of receiving a NO or NC closure to signal building automation, security or alarm system based on a schedule or a command from an input device (e.g. occupancy sensor, daylight sensor, wall switch station, etc.). Each output will have a contact rating of 24VDC@50mA minimum.
j. Panel shall have an easily accessible, removable coin size battery for maintaining system time during a power loss.
k. Panel shall, after a power loss, retain time for a minimum of 72 hours.
l. Panel time shall be updated when connected to a device utilizing the NX Lighting Controls App or from an NX network time server.
m. Panel shall feature a power sensing circuit and transformer for UL924 operation. Upon detection of loss of power, the panel shall force all relays closed and all dimming channels to full bright. Panel shall maintain this state until normal power is restored. Connected devices will not be powered.
n. Panel shall have a test button on the optional UL924 board to test the UL924 operation.
o. Panel shall have a low voltage remote test switch input on the optional UL924 to test the UL924 operation.
p. Panel shall provide relay/dimmer boards to expand panel capacity from 8 to 48 relay outputs in groups of 8. Relay/dimmer boards shall be completely self-configuring and shall not require manual settings to configure for use within the panel.
q. Panel relay/dimmer boards shall confirm relay presence and status.
r. Panel relay/dimmer boards shall have (8) 0-10V integrated dimming channels, each capable of sinking 50mA.
s. Panel dimming channels shall be software assignable.
t. Panel shall be capable of containing 1 to 48 robust and reliable mechanically latching lighting control relays as indicated on the drawings and schedules as specified herein. Electrically held or non-mechanically latching relays shall not be considered.
u. Panel relays shall be individually UL and CUL listed and shall bear labels indicating compliance. Lighting control relays shall be tested to UL standard 508 for both safety and endurances and bare labels signifying compliance.

v. Panel relays shall have the following load ratings:
    1) Single Pole Relays:
        (a) General Use: 30A @ 300VAC
        (b) Tungsten: 2400W @ 120VAC
        (c) Standard Ballast: 20A @ 300VAC
        (d) Motor Starting: 1HP @ 110-125VAC; 1½ HP @ 220-277VAC
    2) Double Pole Relays:
        (a) General Use: 20A @ 480VAC
        (b) Tungsten: 2400W @ 120VAC
        (c) Standard Ballast: 20A @ 480VAC
        (d) Motor Starting: 1HP @ 110-125VAC; 1½ HP at 220-277VAC

w. Panel relays shall be rated for minimum cycle life of 120,000+ operations (60,000+ cycles).

x. Panel relays shall have a Short Circuit Current Rating (SCCR) of 18,000A @ 277VAC.

y. Panel relays shall have a built-in manual override lever & ON/OFF indicator.

z. Panel relays shall be capable of manual activation On or Off with or without power.

9. Functional:
    a. Panel shall be of the distributed intelligence type and shall not be dependent on a network connection to execute schedules or perform programmed functions.
    b. Panel shall be programmed using the optional NXBTC Bluetooth® radio module with clock and NX Lighting Controls App. When networked, panel configurations shall be performed utilizing the NX Area Controller's web-browser based Graphical User Interface.
    c. Panel shall provide the ability to update panel firmware. Firmware update process shall ensure that the complete and correct firmware (e.g. via CRC check) has been downloaded before the panel is flashed with the new firmware.
    d. Panel set up and configuration functions shall include (but are not limited to):
        1) Assign/reassign relays for control by wall switch station buttons,
        2) Configure relays for occupancy or vacancy operation,
        3) Assign/reassign dimmers to raise/lower switches,
        4) Assign dimming channels for response to daylight sensor control,
        5) Assign names to relays/dimmers,
        6) Auto calibrate default daylight sensor sequence of operation,
        7) Create and save preset scenes,
        8) Configure wall switch button types. At a minimum, button types shall include toggle on/off with pilot, preset, on only and off only,
        9) Configure up to six zones of daylight harvesting per room with independent set points and time delays,
        10) Include or exclude loads from occupancy sensor control,
        11) Configure up to 16 load groups per zone,
        12) Configure up to 16 preset scenes per zone with independent fade times,
        13) Set independent power up conditions for relays and dimmers,

14) Set independent occupied and unoccupied conditions for each relay and dimmer,
15) Adjust dimmer high and low trim points,
16) Manually control lighting loads

e. Panel shall provide the ability to create up to ninety-nine (99) schedules per zone. Each schedule will consist of the following:
1) Event Time – Shall be configured as a specific set "Normal" time (hh:mm am/pm) or as an offset based on one of the following: Before Sunrise, After Sunrise, Before Sunset, After Sunset, Before Open, After Open, Before Close or After Close.
2) Action – Task to be performed: None, Group State, or activation of a Preset.
3) None – No action to perform
4) Group State – The specific relay / dim level / color temp range settings, that the select group(s) of actuators should implement.
5) Presets – The specific preset that should be activated.

f. Panel shall provide the ability to disable a schedule
g. Panel shall provide the ability to delete a schedule

2.07 CONTROLLED RECEPTACLES

A. HCS Controlled Receptacle
1. Basis of Design Product: NX Lighting Controls System, HCSREC Series Controlled Receptacle.
2. Controlled Receptacle shall be capable of controlling other receptacles downstream in the branch circuit.
3. Controlled Receptacle shall be automatically controlled by a low voltage signal from an occupancy sensor or any other type of control capable of performing this task, e.g., time-of-day control device.
4. Controlled Receptacle shall be available in split or fully controlled 15A or 20A models.
5. Controlled Receptacle shall feature permanent NEC 406.3 (E) markings.
6. Controlled Receptacle shall be UL498B SA Listed Receptacles with integral switching that complies with Supplement SA.

2.08 SENSORS

A. NX Smart Sensor Module Passive Infrared, Wireless Occupancy & Daylight Sensor
1. Basis of Design Product: NX Lighting Controls System, NX Smart Sensor Modules.
2. As indicated in the specifications and as shown on the plans, install NXSMP series sensor module enabled fixture(s).
3. NX Smart Sensor Module shall be designed to install directly into or on the fixture housing or lens.
4. NX Smart Sensor Module shall integrate seamlessly into the NX Network.
5. NX Smart Sensor Module shall have an RF frequency of 2.4GHz.
6. NX Smart Sensor Module shall include Bluetooth and provide connection to the NX Network using the NX Lighting Controls App.
7. NX Smart Sensor Module Occupancy/Vacancy sensor shall provide automatic or vacancy switching of lighting load(s) within an area/zone based on the presence of human activity.

8. NX Smart Sensor Module Occupancy/Vacancy sensor shall be microprocessor controlled and utilize IntelliSCOPE™ technology to provide real-time graphical occupancy data.
9. NX Smart Sensor Module Occupancy/Vacancy sensor shall not require any adjustments of any kind at the time of installation or during operation.
10. NX Smart Sensor Module Occupancy/Vacancy sensor shall be powered by SmartPORT™ using plenum rated SmartPORT plug and play cables.
11. NX Smart Sensor Module Occupancy/Vacancy sensor shall have a timer that can be adjusted manually from 1 second to 20 minutes.
12. NX Smart Sensor Module Occupancy/Vacancy sensor sensitivity shall be adjustable from 1 to 10.
13. NX Smart Sensor Module Occupancy/Vacancy sensor shall include non-volatile memory for retaining device settings during power outages.
14. NX Smart Sensor Module Occupancy/Vacancy sensor shall have RED real time motion indicator LED visible from the front of the unit.
15. NX Smart Sensor Module Occupancy/Vacancy sensor may be programmed for active and inactive times.
16. NX Smart Sensor Module Occupancy/Vacancy sensor shall be available with the following 360° coverage patterns:
    a. SMI/LMI – 1:1 (mounting height to radius) up to 14 feet
    b. OMNI – 1:1.5 (mounting height to radius) up to 14 feet
    c. LMO – 1:3 (mounting height to radius) up to 16 feet
    d. HMO – 1:1.4 (mounting height to radius) up to 45 feet indoors / 32 feet outdoors
17. NX Smart Sensor Module daylight sensor shall continually measure the amount of visible light under the lighting fixture to provide continuous On/Off and full range dimming control of fixture or group under its control.
18. NX Smart Sensor Module daylight sensor shall utilize a closed loop daylight harvesting algorithm to maintain the required light level in response to changes in daylight.
19. NX Smart Sensor Module daylight sensor shall have independently programmable ramp up and ramp down times to allow the sensor to respond quickly to decrease in daylight and respond more slowly to increase in daylight to minimize the effect of sudden changes in daylight.
20. NX Smart Sensor Module daylight sensor shall be capable of being programmed for active and inactive times.
21. NX Smart Sensor Module daylight sensor shall include non-volatile memory for retaining device settings during power outages.

B. NX Smart Sensor Module Passive Infrared, Wireless Occupancy & Daylight Wall Switch Sensor
    1. Basis of Design Product: NX Lighting Controls System, NX Smart Sensor Modules.
    2. As indicated in the specifications and as shown on the plans, install NXSMP series sensor modules.
    3. NX Smart Sensor Module shall be designed for indoor use only and to mount directly in single-gang NEMA-style switch box (standard switch box – max mounting height: 48”).
    4. NX Smart Sensor Module shall integrate seamlessly into the NX Network.
    5. NX Smart Sensor Module shall have an RF frequency of 2.4GHz.
    6. NX Smart Sensor Module shall include Bluetooth and provide connection to the NX Network using the NX Lighting Controls App.

7. NX Smart Sensor Module Occupancy/Vacancy sensor shall provide automatic or vacancy switching of lighting load(s) within an area/zone based on the presence of human activity.
8. NX Smart Sensor Module Occupancy/Vacancy sensor shall be microprocessor controlled and shall have Passive Infrared (PIR) detection technology.
9. NX Smart Sensor Module Occupancy/Vacancy sensor shall utilize IntelliSCOPE™ technology to enable fine-tuning of the motion detection technologies using real-time Passive Infrared (PIR) graphical occupancy data.
10. NX Smart Sensor Module Occupancy/Vacancy sensor shall be powered by SmartPORT™ using plenum rated SmartPORT plug and play cables.
11. NX Smart Sensor Module Occupancy/Vacancy sensor shall have a timer that can be adjusted manually from 1 second to 20 minutes.
12. NX Smart Sensor Module Occupancy/Vacancy sensor sensitivity shall be adjustable from 1 to 10.
13. NX Smart Sensor Module Occupancy/Vacancy sensor shall include non-volatile memory for retaining device settings during power outages.
14. NX Smart Sensor Module Occupancy/Vacancy sensor shall have a Red Passive Infrared (PIR) real time motion indicator LED visible from the front of the unit.
15. NX Smart Sensor Module Occupancy/Vacancy sensor may be programmed for active and inactive times.
16. NX Smart Sensor Module Occupancy/Vacancy sensor shall have the following coverage:
    a. Coverage: Adjustable up to 1,000 square feet
    b. Max Mounting Height: 48”
17. NX Smart Sensor Module daylight sensor shall continually measure the amount of visible light under the lighting fixture to provide continuous On/Off and full range dimming control of fixture or group under its control.
18. NX Smart Sensor Module daylight sensor shall utilize a closed loop daylight harvesting algorithm to maintain the required light level in response to changes in daylight.
19. NX Smart Sensor Module daylight sensor shall have independently programmable ramp up and ramp down times to allow the sensor to respond quickly to decrease in daylight and respond more slowly to increase in daylight to minimize the effect of sudden changes in daylight.
20. NX Smart Sensor Module daylight sensor shall include non-volatile memory for retaining device settings during power outages.
21. NX Smart Sensor Module shall have fully configurable switch type functionality.
22. NX Smart Sensor Module shall have a programmable lightbar with multiple modes: Location Indicator, Group Status, and Occupancy.
23. NX Smart Sensor Module shall be available in White, Black, Gray, Ivory, Light Almond and Red colors.

C. NX Smart Sensor Module Occupancy/Vacancy sensor sensitivity shall be adjustable from 1 to 10.
1. NX Smart Sensor Module Occupancy/Vacancy sensor shall include non-volatile memory for retaining device settings during power outages.
2. NX Smart Sensor Module Occupancy/Vacancy sensor shall have a Red Passive Infrared (PIR) real time motion indicator LED visible from the front of the unit.
3. NX Smart Sensor Module Occupancy/Vacancy sensor may be programmed for active and inactive times.
4. NX Smart Sensor Module Occupancy/Vacancy sensor shall have the following coverage:

a. Coverage: Adjustable up to 1,000 square feet
b. Max Mounting Height: 48”

5. NX Smart Sensor Module daylight sensor shall continually measure the amount of visible light under the lighting fixture to provide continuous On/Off and full range dimming control of fixture or group under its control.
6. NX Smart Sensor Module daylight sensor shall utilize a closed loop daylight harvesting algorithm to maintain the required light level in response to changes in daylight.
7. NX Smart Sensor Module daylight sensor shall have independently programmable ramp up and ramp down times to allow the sensor to respond quickly to decrease in daylight and respond more slowly to increase in daylight to minimize the effect of sudden changes in daylight.
8. NX Smart Sensor Module daylight sensor shall include non-volatile memory for retaining device settings during power outages.
9. NX Smart Sensor Module shall have fully configurable switch type functionality.
10. NX Smart Sensor Module shall have a programmable lightbar with multiple modes: Location Indicator, Group Status, and Occupancy.
11. NX Smart Sensor Module shall be available in White, Black, Gray, Ivory, Light Almond and Red colors.
12. NX Smart Sensor Module DT Occupancy/Vacancy sensor sensitivity shall be adjustable from 1 to 10.
13. NX Smart Sensor Module DT Occupancy/Vacancy sensor shall include non-volatile memory for retaining device settings during power outages.
14. NX Smart Sensor Module DT Occupancy/Vacancy sensor shall have a Red Passive Infrared (PIR) and Green Ultrasonic (US) real time motion indicator LEDs visible from the front of the unit.
15. NX Smart Sensor Module DT Occupancy/Vacancy sensor may be programmed for active and inactive times.
16. NX Smart Sensor Module DT Occupancy/Vacancy sensor shall have the following coverage:
17. Coverage: Adjustable up to 1,000 square feet
18. Max Mounting Height: 48”
19. NX Smart Sensor Module DT daylight sensor shall continually measure the amount of visible light under the lighting fixture to provide continuous On/Off and full range dimming control of fixture or group under its control.
20. NX Smart Sensor Module DT daylight sensor shall utilize a closed loop daylight harvesting algorithm to maintain the required light level in response to changes in daylight.
21. NX Smart Sensor Module DT daylight sensor shall have independently programmable ramp up and ramp down times to allow the sensor to respond quickly to decrease in daylight and respond more slowly to increase in daylight to minimize the effect of sudden changes in daylight.
22. NX Smart Sensor Module DT daylight sensor shall include non-volatile memory for retaining device settings during power outages.
23. NX Smart Sensor Module DT shall have fully configurable switch type functionality.
24. NX Smart Sensor Module DT shall have a programmable lightbar with multiple modes: Location Indicator, Group Status, and Occupancy.

25. NX Smart Sensor Module DT shall be available in White, Black, Gray, Ivory, Light Almond and Red colors.

D. NX Smart Sensor Module Dual Technology, Wireless Occupancy & Daylight Wall Switch Sensor
   1. Basis of Design Product: NX Lighting Controls System, NX Smart Sensor Modules.
   2. As indicated in the specifications and as shown on the plans, install NXSMDT series sensor modules.
   3. NX Smart Sensor Module DT shall be designed for indoor use only and to mount directly to ceilings.
   4. NX Smart Sensor Module DT shall integrate seamlessly into the NX Network.
   5. NX Smart Sensor Module DT shall have an RF frequency of 2.4GHz.
   6. NX Smart Sensor Module shall include Bluetooth and provide connection to the NX Network using the NX Lighting Controls App.
   7. NX Smart Sensor Module DT Occupancy/Vacancy sensor shall provide automatic or vacancy switching of lighting load(s) within an area/zone based on the presence of human activity.
   8. NX Smart Sensor Module Occupancy/Vacancy sensor shall be microprocessor controlled and shall have adjustable technology detection modes including Dual Technology (Passive Infrared (PIR) and Ultrasonic (US)), Passive Infrared (PIR) only, and Ultrasonic (US) only.
   9. NX Smart Sensor Module Occupancy/Vacancy sensor shall utilize IntelliSCOPE™ technology to enable fine-tuning of the motion detection technologies using real-time Passive Infrared (PIR) and Ultrasonic (US) graphical occupancy data.
   10. NX Smart Sensor Module DT Occupancy/Vacancy sensor shall be powered by SmartPORT™ using plenum rated SmartPORT plug and play cables.
   11. NX Smart Sensor Module DT Occupancy/Vacancy sensor shall have a timer that can be adjusted manually from 1 second to 20 minutes.
   12. NX Smart Sensor Module DT Occupancy/Vacancy sensor sensitivity shall be adjustable from 1 to 10.
   13. NX Smart Sensor Module DT Occupancy/Vacancy sensor shall include non-volatile memory for retaining device settings during power outages.
   14. NX Smart Sensor Module DT Occupancy/Vacancy sensor shall have a Red Passive Infrared (PIR) and Green Ultrasonic (US) real time motion indicator LEDs visible from the front of the unit.
   15. NX Smart Sensor Module DT Occupancy/Vacancy sensor may be programmed for active and inactive times.
   16. NX Smart Sensor Module DT Occupancy/Vacancy sensor shall have the following coverage:
      a. 1:2.75 Coverage pattern (mounting height to coverage radius)
      b. Coverage: Adjustable up to 2,000 square feet
      c. Recommended Mounting Height: 8ft (2.44m) with a max mounting height: 12ft (3.66m)
   17. NX Smart Sensor Module DT daylight sensor shall continually measure the amount of visible light under the lighting fixture to provide continuous On/Off and full range dimming control of fixture or group under its control.

18. NX Smart Sensor Module DT daylight sensor shall utilize a closed loop daylight harvesting algorithm to maintain the required light level in response to changes in daylight.
19. NX Smart Sensor Module DT daylight sensor shall have independently programmable ramp up and ramp down times to allow the sensor to respond quickly to decrease in daylight and respond more slowly to increase in daylight to minimize the effect of sudden changes in daylight.
20. NX Smart Sensor Module DT daylight sensor shall include non-volatile memory for retaining device settings during power outages.
21. NX Smart Sensor Module DT shall be available in White, Black and Gray colors.

E. NX Occupancy Sensors, Wired
1. Basis of Design Product: NX Lighting Controls System, NX Occupancy Sensors.
2. NX Occupancy Sensors shall be ceiling or wall mounted and use dual technology (ultrasonic and passive infrared), ultrasonic and/or passive infrared (model specific) sensing technology as indicated.
3. NX Occupancy Sensors shall be Class 2 and connect to any room controller SmartPORT using a wiring adaptor and standard Cat5 patch cable.
4. NX Occupancy Sensors shall be microprocessor controlled and utilize IntelliDAPT® technology to optimize sensor behavior to adapt to space conditions and occupant usage patterns and adjust sensitivity and time delay to maximize energy savings and minimize false On and Off events
5. NX Occupancy Sensors shall be self-adaptive and not require manual calibration after installation. Digital circuitry and logic shall automatically adjust the sensitivity and time delay based on learned occupancy patterns and the environment in which the sensor is installed.
6. NX Occupancy Sensors using both ultrasonic and passive infrared (dual technology) shall operate such that detection by both technologies is required to initiate occupancy and continued detection by either technology will maintain occupancy.
7. Up to four NX Occupancy Sensors may be connected to one room controller.

F. NX Occupancy Output Interface
1. Basis of Design Product: NX Lighting Controls System, NXRO Series Occupancy Output Interface Module.
2. NX Occupancy Output Interface shall communicate the occupancy state of an NX control zone to HVAC or other building systems using a contact closure.
3. NX Occupancy Output Interface shall connect to a SmartPORT™ and provide the aggregate occupancy state of the zone as reported by one or more occupancy sensors.
4. NX Occupancy Output Interface shall mount to a standard 4 11/16” junction box.
5. NX Occupancy Output Interface shall have a removable terminal block for input connection.
6. NX Occupancy Output Interface shall be powered by NX SmartPORT.
7. NX Occupancy Output Interface shall support multiple occupancy sensors in a zone.
8. NX Occupancy Output Interface shall feature a low voltage Form-C relay for Normally Closed / Normally Open operation.
9. NX Occupancy Output Interface shall be a low voltage device: 24VDC.

G. NX Daylight Sensor, Wired
1. Basis of Design Product: NX Lighting Controls System, NXDS Series Daylight Sensor.

2. NX Daylight Sensor shall provide ambient light level information to the room controller allowing daylight responsive lighting control.
3. The system shall operate in an open loop sequence of operation reducing the amount of electric light as the quantity of daylight entering the room increases.
4. It shall be possible to configure up to six daylight zones in a room. Each zone shall be programmable to proportionally respond to the light level provided by the daylight sensor.
5. NX Daylight Sensor shall be mounted vertically or horizontally and positioned to provide an unobstructed view of the windows per the manufacturer's directions.
6. NX Daylight Sensor shall be available in indoor and outdoor models.
7. NX Daylight Sensor shall have an architecturally attractive design.
8. NX Daylight Sensor shall have a foot-candle range: 3-6,000FC

H. NX Wall Partition Sensor
1. Basis of Design Product: NX Lighting Controls System, NXWPS Series Wall Partition Sensor.
2. NX Wall Partition Sensor shall automatically signal the NX Lighting Controls System when a moveable partition has been opened or closed. This allows the two adjacent rooms to be combined or separated into individual rooms.
   a. NX controls shall automatically reconfigure to operate in unison when rooms are combined.
   b. NX controls shall automatically reconfigure to operate independently when the rooms are separated.
   c. NX system shall allow for room combine scenarios with up to 16 combinable rooms.
3. NX Wall Partition Sensor shall be a low voltage device: 24VDC.

I. NX Dry Contact Closure Interface
1. Basis of Design Product: NX Lighting Controls System, NXCI Series Contact Closure Interface.
2. NX Dry Contact Closure Interface shall enable third-party devices to provide dry contact inputs to the NX Lighting Controls System.
3. NX Dry Contact Closure Interface shall provide switch activation using contact closures from external devices such as key switches, AV systems, photo-eye sensors or other low voltage Class 2 devices.
4. NX Dry Contact Closure Interface shall default to On/Off operation and can be programmed to perform alternate functions including:
   a. Toggle On/Off
   b. Preset
   c. Raise
   d. Lower
   e. Timed On
5. NX Dry Contact Closure Interface shall feature a removable terminal block for input connection.
6. NX Dry Contact Closure Interface shall feature pilot light output terminals.
7. NX Dry Contact Closure Interface shall be a low voltage device: 24VDC.

2.09 WALL STATIONS

A. NX SimpleTouch™ Graphic Wall Station

1. Basis of Design Product: NX Lighting Controls System, NX SimpleTouch Graphic Wall Station.
2. Graphic Wall Station shall employ a 3.5” resistive LCD-TFT, full-color touch screen with 320x480 screen resolution in portrait orientation.
3. Graphic Wall Station shall mount to a standard single gang switch box.
4. Graphic Wall Station shall utilize standard Cat5 cabling for connection to system SmartPORT. Provide two RJ45 ports to allow daisy chain connection with other NX Smart Switches.
5. Graphic Wall Station shall operate seamlessly with other NX Smart Switches.
6. Graphic Wall Station shall provide a 4GB microSD card for storing user preferences that include the quantity of controls per screen, function names, screen navigation, home screen selection, and custom screen saver graphic image.
7. Graphic Wall Station screens can be configured to meet project requirements for control of up to 16 groups, each with provision for On/Off and dimming, up to 16 preset scenes, or CCT color control.
8. Graphic Wall Station shall be capable of local control within a single space or configured for master control across spaces or building wide.
9. Graphic Wall Station shall have an optional password access control that will require a secure PIN to access the station.
10. Graphic Wall Station shall have adjustable screensaver timeout and backlight brightness.
11. Graphic Wall Station shall be supplied with a white bezel. Optional color change kit shall allow for Ivory, Grey, Light Almond, or Black.

B. NX Smart Switches (Wired)
1. Basis of Design Product: NX Lighting Controls System, NXSW Series Smart Switches (Wired).
2. NX Smart Switches (Wired) shall be of the programmable type using standard Cat5 cabling for connection to system SmartPORT™.
3. NX Smart Switches (Wired) shall have one to six buttons and provide lighting control functions as called out and shown on the plans.
4. NX Smart Switches (Wired) shall be available with the following specialty versions:
    a. OO: On/Off
    b. ORLO: On/Raise/Lower/Off
    c. RL: Raise/Lower
    d. TO: Timed-On
    e. SS: Scene
5. Construction:
    a. Housing: Rugged, high impact, injection molded plastic
    b. Mounting: Switches shall be capable of being mounted to single-gang and multi-gang wall boxes and shall be compatible with standard decorator style wall plates.
6. Electrical:
    a. Class 2 Low Voltage 24VDC
    b. Connection via two (2) RJ-45 SmartPORTs to allow for daisy chain connection of up to eight switches to each SmartPORT.
7. NX Smart Switches (Wired) shall be available in White, Ivory, Light Almond, Gray, Black, and Red.

C. NX Smart Switches (Wireless)

1. Basis of Design Product: NX Lighting Controls System, NXSW Series Smart Switches (Wireless).
2. NX Smart Switches (Wireless) shall be of the programmable type using the NX Lighting Controls App.
3. NX Smart Switches (Wireless) shall have a single rocker switch with two momentary switches and provide lighting control functions as called out and shown on the plans.
4. NX Smart Switches (Wireless) shall be programmable with the following switch functions:
    a. On/Off
    b. On/Raise
    c. Off/Lower
    d. Raise
    e. Lower
    f. Timed-On
    g. Scene
5. Construction:
    a. Housing: Rugged, high impact, injection molded plastic
    b. Mounting: Switches shall be capable of being mounted directly to wall surfaces using provided 3M Command™ Strip, and to single-gang and multi-gang wall boxes and shall be compatible with standard decorator style wall plates (not included).
    c. Switches shall include a built-in level to ensure device is mounted properly.
6. Electrical:
    a. Class 2 Low Voltage 24VDC
    b. 3VDC, 5.4mA
    c. Powered using CR2032 battery only
7. NX Smart Switches (Wireless) shall be available in White.

D. NX Audio Visual Interface Module
1. Basis of Design Product: NX Lighting Controls System, NXAVM Series Audio Visual Interface Module.
2. NX Audio Visual Interface Module shall enable third-party systems to digitally interface with an NX Lighting Controls System.
3. NX Audio Visual Interface Module shall provide an ASCII based command set to interface with third-party systems such as Audio-Visual systems to send commands to and receive query status from an NX system.
4. NX Audio Visual Interface Module shall feature a DB9 connector and support RS232 serial communication, providing control and status for a single zone.
5. NX Audio Visual Interface Module shall mount to a standard 4 11/16” junction box.

2.10 NETWORK AREA CONTROLLER

A. NX Area Controller
1. Basis of Design Product: NX Lighting Controls System, NX Area Controller V2 (NXAC2 Series).
2. NX Area Controller shall connect to the NX Network providing communication with the NX Room Controllers, NX Lighting Control Panels, NX SmartPORT™ Modules and other wired NX system components.

3. NX Area Controller shall have the ability to communicate by means of TCP/IP over Ethernet allowing enterprise connectivity between the NX Lighting Controls System and external LAN or WAN networks.
4. NX Area Controller shall be capable of communicating with Building Automation System via an embedded BACnet™ client using the BACnet IP protocol.
5. NX Area Controller shall enable the connection of multiple users simultaneously.
6. NX Area Controller shall enable secure remote connections over a cellular network.
7. NX Area Controller shall have a physical modem switch that can turn off remote cellular and Wi-Fi radios.
8. NX Area Controller shall feature user account/password management.
9. Construction:
    a. Design: Solid State – No moving parts
    b. 7.32” W x 2.6” H x 4.9” D (186mm x 66mm x 126mm)
    c. 2.9 LB (1.21 KG)
    d. Mounting: Wall or DIN rail mounting
    e. Housing Color: Black
10. Electrical:
    a. 100-240VAC, 50/60 Hz (AC Adapter included)
    b. Ethernet 10 base-T via NX Network cable, integral 2-port ethernet hub.
11. Functional:
    a. NX Area Controller shall function as a web server allowing the user interface to be accessible through a standard web browser.
    b. The installation of software shall not be required. At a minimum, the user interface shall provide the following functions:
        1) Automatic discovery of NX system devices
        2) Commissioning of devices into logical Areas and Zones, provide a minimum of 128 areas each with 128 zones
        3) Display the entire system in a logical navigation tree view
        4) Allow the user to name Zones, Groups, Presets, Schedules and individual loads
        5) Set up control functions for system inputs and outputs
        6) Monitor status and override individual relays and dimmers
        7) Set up and download schedules to panels and room controllers
        8) Monitor real-time power use at each room controller

2.11 NETWORK MODULES

A. NX Network Bridge Module
1. Basis of Design Product: NX Lighting Controls System, NX Network Bridge Module.
2. NX Network Bridge Module shall allow multiple room controller zones to be networked with other NX system devices for whole building administration of lighting control functions.
3. NX Network Bridge Module housing shall measure 5.75" X 3.85" X 1.3"and be constructed of GSM UL rated 94 HB plastic approved for use in a return air plenum.
4. NX Network Bridge Module shall connect to and be powered from a room controller SmartPORT via a standard Cat5 cable.

5. NX Network Bridge Module shall provide RJ-45 ports for in and out connection points for an Ethernet based network.
6. NX Network Bridge Module shall provide a communication link between the room control devices and the NX system Area Controller via an Ethernet based network. At a minimum, the network link shall provide the following functionality through a web browser user interface:
    a. Report the current occupancy status for each lighting control zone
    b. Indicate the status of each relay and dimming channel
    c. Allow reconfiguration of system device input and output parameters
    d. Report the real time power consumption for each Room Controller
    e. Set up daylight harvesting for zones equipped with photocells
    f. Configure and download schedules to panels and Room Controllers

B. NX Network Radio Module
1. Basis of Design Product: NX Lighting Controls System, NXRM2 Series Radio Module.
2. NX Network Radio Module shall allow a luminaire equipped with the NXFM In-Fixture Module to be promoted wirelessly from standalone operation to full network participation.
3. NX Network Radio Module shall plug into the SmartPORT™ connector on the NXFM In-Fixture Module and is mounted through a 1.25” aperture in the luminaire housing.
4. NX Network Radio Module shall feature a low-profile housing for minimal visual impact.
5. NX Network Radio Module shall feature an O-ring gasket to provide watertight seal to luminaire housing.
6. NX Network Radio Module shall have an integrated and compact PCB F antenna and shall not require an external antenna.
7. NX Network Radio Module shall integrate seamlessly into the NX Network.
8. NX Network Radio Module shall have an RF frequency of 2.4GHz.
9. NX Network Radio Module shall include Bluetooth and provide connection to the NX Network using the NX Lighting Controls App.

C. NX Network Interface Module:
1. Basis of Design Product: NX Lighting Controls System, NXHDI Series Device Network Interface Module.
2. NX Network Interface Module shall provide network connection and power to accessory components including NX Dry Contact Interface and NX SmartPORT Modules.
3. NX Network Interface Module shall be discoverable by the NX Area Controller and controllable through web browser interface.
4. NX Network Interface Module shall repeat network communication signal to extend network length.
5. NX Network Interface Module shall feature integral link indicators confirming network segment status.
6. NX Network Interface Module shall feature a power LED indicator confirming presence of accessory DC power on NX Network segment.
7. NX Network Interface Module shall feature dual RJ45 NX Network input and output jacks to enable module to be inserted anywhere along the NX Network as needed.
8. Construction:
    a. Extruded and sheet aluminum
    b. Weight: 6 oz (170.1g)
    c. Mounting: 1.38” (35mm) DIN rail

9. Electrical:
    a. Input: 24VDC, 800mA max current via NX Network cable
    b. Output: 24VDC power supplied to connected accessory modules
10. NX Network Interface Module shall be Title 24 Compliant.

D. NX SmartPORT Module
1. Basis of Design Product: NX Lighting Controls System, NX SmartPORT Module.
2. NX SmartPORT Module shall provide the ability to easily connect smart switch stations, motion detectors, and daylight sensors into the NX network system.
3. NX SmartPORT Module shall have (4) SmartPORTs each with (2) RJ45 connectors for convenient connection of multiple devices.
4. Devices connected to the SmartPORT module shall be network visible and configurable to operate with panels and room controllers via the web browser user interface.
5. NX SmartPORT Module shall be compatible with all NX Smart Switch Stations, NX Occupancy Sensors and NX Daylight Sensor.
6. NX SmartPORT Module shall feature DIN rail mounting.
7. NX SmartPORT Module shall be a low voltage device: 24VDC.

E. NX Dry Contact Interface Module
1. Basis of Design Product: NX Lighting Controls System, NXDCIO Series Dry Contact Interface Module.
2. NX Dry Contact Interface Module shall provide a simple way to incorporate standard dry contact inputs and outputs into the NX Lighting Controls System.
3. NX Dry Contact Interface Module shall accommodate dry contact input closures from building automation, fire, security, and many other types of systems.
4. NX Dry Contact Interface Module shall be programmable from the NX Area Controller.
5. NX Dry Contact Interface Module shall feature (6) individually programmable dry contact inputs with or without pilots.
6. NX Dry Contact Interface Module shall accommodate 2 and 3 wire inputs (momentary or maintained).
7. NX Dry Contact Interface Module shall feature (6) individually programmable Form-C dry contact outputs.
8. NX Dry Contact Interface Module shall have removable terminal blocks for easy connections.
9. NX Dry Contact Interface Module shall feature DIN rail mounting.
10. NX Dry Contact Interface Module shall be a low voltage device: 24VDC.

2.12 NETWORK ACCESSORIES

A. NX Bluetooth® Radio Bridge with Real Time Clock
1. Basis of Design Product: NX Lighting Controls System, NXBTC Series Bluetooth Radio Controller.
2. NX Bluetooth Radio Bridge with Real Time Clock shall provide a wireless communication bridge for communications via iOS® or Android™ smart device apps.
3. NX Bluetooth Radio Bridge with Real Time Clock shall connect to and be powered by an NX SmartPORT™.
4. NX Bluetooth Radio Bridge with Real Time Clock shall use Bluetooth technology allowing the radio to easily pair with a smart phone or tablet.

5. NX Bluetooth Radio Bridge with Real Time Clock shall communicate with the NX system for setup and control from a smart device.
6. NX Bluetooth Radio Bridge with Real Time Clock shall feature a real time clock and allow schedules to be downloaded and run in stand-alone NX Room Controller applications without a network.
7. NX Bluetooth Radio Bridge with Real Time Clock shall provide password protections for user access preventing unauthorized Bluetooth connection of a smart device.
8. NX Bluetooth Radio Bridge with Real Time Clock shall use Bluetooth Version 4.1.
9. NX Bluetooth Radio Bridge with Real Time Clock shall feature an LED status indicator for successful connections.
10. NX Bluetooth Radio Bridge with Real Time Clock shall have a RJ45 plug-in connection to NX SmartPORT.
11. NX Bluetooth Radio Bridge with Real Time Clock shall be a low voltage 24VDC device.
12. NX Bluetooth Radio Bridge with Real Time Clock shall be rated for return air plenum

B. NX Media Converter
1. Basis of Design Product: NX Lighting Controls System, NXEOF Series Media Converter.
2. NX Media Converter shall allow a transition from copper based ethernet to fiber.
3. NX Media Converter shall support 10BASE-T, 100BASE-TX, 100BASE-FX and IEEE 802.3 specifications.
4. NX Media Converter shall be a multimode converter and support up to 5km distance.
5. NX Media Converter shall include and RJ45 port that supports full/half-duplex auto-negotiation and MDI/MDIX auto-crossover.
6. NX Media Converter shall include LED indicators for RJ45 and fiber port status.
7. NX Media Converter shall include a wall mounting kit.

C. NX Network PoE Switch
1. Basis of Design Product: NX Lighting Controls System, NXPOE Series PoE Switch/Power Injector.
2. NX Network PoE Switch shall provide the splitting of the Network network from the NX Area Controller into multiple segments.
3. NX Network PoE Switch shall provide seven powered RJ45 ports for connection of NX network devices.
4. NX Network PoE Switch shall provide multiple dimming options including DMX to less than 0.1%.
5. NX Network PoE Switch shall expand the capacity of the NX Area Controller to 448 bridges suitable for large commercial and architectural interiors.

D. NX Energy Dashboard
1. Basis of Design Product: NX Lighting Controls System, NX Energy Dashboard.
2. NX Energy Dashboard shall provide real-time monitoring of energy consumption for the NX Lighting Controls System.
3. NX Energy Dashboard shall provide monitoring for up to 300 zones.
4. NX Energy Dashboard shall report out power and energy consumption for a specific, user selected zone.
5. NX Energy Dashboard shall be able to export out consumption data in .csv format for third party applications.
6. NX Energy Dashboard shall provide a wide range of reporting & monitoring intervals from less than an hour to multiple years.

7. NX Energy Dashboard shall be able to manage user rights & permissions to access the dashboard portal.
8. NX Energy Dashboard shall be able to manage system configuration changes and network settings.
9. Construction:
    a. NX Energy Dashboard electronics shall be housed in a NEMA 1 polycarbonate enclosure suitable for surface wall mounting.
    b. NX Energy Dashboard enclosure shall measure 13.41"H x 11.41" W x 7.38" D and include a hinged locking door.
    c. NX Energy Dashboard enclosure shall be IP66 rated.
    d. NX Energy Dashboard components shall be mounted inside the enclosure on flat panel, 35mm DIN rail.
10. Electrical:
    a. Input: 120-240VAC, 60Hz hard wired supply connection.
11. Networking & Software:
    a. N4 Niagara Operating System.
    b. 10-Base T Ethernet via (2) RJ-45 ports.
    c. (1) Micro USB for serial shell access.
    d. (1) Mini-B USB port
    e. 4GB Internal flash memory for storage

E. NX Forward and Reverse Phase Dimming Converter
1. Basis of Design Product: NX Lighting Controls System, NX Forward and Reverse Phase Dimmer Converter.
2. NX Forward and Reverse Phase Dimmer shall auto-sense forward and reverse phase dimming.
3. NX Forward and Reverse Phase Dimmer shall dim standard 120V or 277V lighting loads.
4. NX Forward and Reverse Phase Dimmer shall support up to 1300W max load.
5. NX Forward and Reverse Phase Dimmer shall provide dual 0-10V input and output ports.
6. NX Forward and Reverse Phase Dimmer shall provide an integrated 6.5ft flexible conduit.
7. NX Forward and Reverse Phase Dimmer shall be compatible with NX Room Controllers, NX Lighting Control Panels and Low Voltage Dimming Switches.
8. Construction:
    a. Housing: Anodized aluminum
    b. Size: 4.01” L x 5.52” W x 1.88” H
    c. Complies with requirements for use in a plenum area
    d. Mounting: Surface mount with screws
9. Electrical:
    a. Input: 120/277VAC, 60Hz – Single feed input connection
    b. Output: 120/277VAC, 60Hz – Single feed output connection
    c. Low Voltage: Class 2, 0-10V Input and output
    d. Max Load Rating:
        1) 120VAC: 700W
        2) 277VAC – 1300W
    e. Min Load Rating: 24W
    f. Standby Power:

1) 120VAC: 0.75W
2) 277VAC: 1.87W

g. Dimming:
1) Class 2 / Class 1 (NOTE: Installation as Class 1 requires 600 volt insulation on dimming conductors sharing a conduit with line voltage conductors)

2.13 SOFTWARE INTERFACES

A. NX Site Manager Graphical User Interface (GUI):
1. NX Site Manager GUI shall serve as a primary interface for the networked lighting system, providing communication with lighting control panels, room controllers, fixture modules, and other wired system components and through wireless access point to wireless room controllers and fixture modules.
2. NX Site Manager GUI shall be accessible via conventional PC/Tablet web browser through the Site Manager's built-in web server.
3. NX Site Manager GUI shall enable users to program, monitor, and administer the NX Lighting Controls System from any location without additional software.
4. NX Site Manager GUI shall enable users to configure general client information including client name, address, phone, email and a custom image.
5. NX Site Manager GUI shall enable users to select from a list of standard United States holidays and to configure custom holidays.
6. NX Site Manager GUI shall enable users to create one or more buildings and configure building information include building name, address, latitude/longitude, phone, electricity cost per kilowatt, custom image, hours of operation and open/close times.
7. NX Site Manager GUI shall enable users to import license files to unlock separately licensable features of Site Manager.
8. NX Site Manager GUI shall enable users to reset forgotten passwords based on a set of password-reset questions.
9. NX Site Manager GUI shall enable system administrators to configure an interactive user session timeout
10. NX Site Manager GUI shall enable system administrators to select a self-signed or trusted certificate security mode and specify domain name, certificate, certificate key and certificate chain.
11. NX Site Manager GUI shall enable system administrators to create user roles (e.g., system admin, facility manager, general user), specify role permissions, and assign areas of responsibility. Role permissions shall be configurable for application management, client management, device management and building operation and shall include the ability to edit, view-only, or none.
12. NX Site Manager GUI shall enable system administrators to perform user management tasks including adding users, assigning roles & permissions, activating & locking user accounts, and deleting user accounts.
13. NX Site Manager GUI shall enable users to modify their user profile information including name, email, phone, address, password, and password-reset security questions.
14. NX Site Manager GUI shall enable users to configure NX Site Manager Adapters which manage the NX Network. Each NX Site Manager Server shall include an embedded Site Manager Adapter. Adding additional NX Site Manager Adapter devices to the NX Network provides the ability to expand the NX Network. Each NX Site Manager Adapter

will be assigned to a specific Site Manager building and will communicate with the Site Manager Server over an IP (Ethernet) network.

15. NX Site Manager GUI shall enable users to configure system settings including network IP information, general data management, software updates, log files, scheduled jobs, and diagnostics.
16. NX Site Manager GUI shall include an embedded BACnet IP client that is field configurable, enabling integration of the NX Lighting Controls System and a building automation system.
17. NX Site Manager GUI shall enable users to discover networked devices, devices by MAC address or all devices for each Site Manager Adapter. Discovered devices shall appear in a tree showing the physical connections of devices.
18. NX Site Manager GUI shall enable users to create up to 128 Areas and 128 Zones per Area.
19. NX Site Manager GUI shall enable users to assign devices to Zones by dragging and dropping the selected device into a zone, or by using the drop-down selection tool.
20. NX Site Manager GUI shall enable users to create up to 16 Groups per Zone. Users shall be able to assign/select devices for each group and test the group by turning the group on/off and adjusting the dimmer and CCT levels.
21. NX Site Manager GUI shall enable users to create up to 99 Presets per Zone. Users shall be able to include/exclude actuators, configure actuator settings and test the preset by activating it.
22. NX Site Manager GUI shall enable users to create up to 99 Schedules per Zone. Users shall be able to name each schedule, specify the schedule type and occurrence, and specify the action that will take place for the selected group or preset. NX Site Manager GUI shall also enable the user to assign a color to the schedule.
23. NX Site Manager GUI shall enable users to select a device and configure that device's general information and device settings.
24. NX Site Manager GUI shall enable users to copy a device's settings, wink a device, resync a device, swap devices, specify active/inactive times, and decommission devices.
25. NX Site Manager GUI shall enable users to generate and export (.csv) reports including:
    a. Zone Summary
    b. CCT Summary
    c. Dimmer Summary
    d. In-Fixture Module Summary
    e. Occupancy Sensor Summary
    f. Photocell Sensor Summary
    g. Relay Summary
    h. Switch Station Summary
    i. Power Input
    j. Firmware
26. NX Site Manager GUI shall enable users to perform firmware updates by device type.
27. NX Site Manager GUI shall enable users to define up to 10 Demand Response levels per Zone. Users shall be able to select a Demand Response level and configure all actuator types to the same demand response setting or specify individual actuator demand response settings.

28. NX Site Manager GUI shall enable users to add a floor plan image to an Area. Image file types supported shall include .SVG, .JPG, and .PNG. Max image size supported shall be 10MB.
29. NX Site Manager GUI shall enable users to select a Zone and draw the selected zone's boundaries on the floor plan image. Zones that have floor plan zone boundaries created, shall display an indicator next to the Zone name.
30. NX Site Manager GUI shall enable users to modify/delete the floor plan zone boundaries.
31. NX Site Manager GUI shall enable users to zoom in / zoom out the floor plan image.
32. NX Site Manager GUI shall enable users to select a zone on the floor plan image and have the Zone name selected and highlighted in the navigational tree. Users shall also be able to select a Zone name in the navigational tree and have the zone selected and highlighted on the floor plan image.
33. NX Site Manager GUI shall enable users to delete a floor plan image assigned to an Area.
34. NX Site Manager GUI shall have an operational mode for users to view the status of Zones on a floor plan image. Status information shall be color coded and include on/off states and occupied/unoccupied states. Zones with no occupancy sensors shall be identified as having "No Occupancy Sensors". NX Site Manager GUI shall enable users with achromatopsia ("color blindness") to identify zone status with easy to differentiate status borders around each zone.
35. NX Site Manager GUI shall enable users to control a zone by selecting a Zone from the navigational tree or from the floor plan image. Once selected, the Zone Controller window shall appear enabling the user to turn the Zone on/off, change light and/or color tuning levels for all groups within the Zone or specific groups. The Zone Controller window shall also enable users to see the occupancy status of the Zone and the schedules associated with the Zone.
36. NX Site Manager GUI shall have an operational mode for users to view a site's energy usage and cost in an easy to read dashboard. Users shall be able to see energy usage for selected areas and zones. NX Site Manager GUI shall enable users to select a daily, weekly, monthly, yearly or custom date range view of the energy data. Users shall be able to hover over the graphs to view actual data values and view data over a specific date range. NX Site Manager GUI shall enable users to export energy data to a .CSV (Comma Separated Variable) file.
37. NX Site Manager GUI shall have an operational mode for users to view/modify Zone schedules. All Zone schedules shall be displayed in an easy to use calendar that supports multiple viewing modes including by day, week or month. Users shall be able to select and modify a schedule by selecting the Zone in the navigational tree or by selecting the schedule from the calendar.

B. NX Area Controller Graphical User Interface (GUI):
1. NX Area Controller GUI shall serve as a primary interface for the networked lighting system, providing communication with lighting control panels, room controllers, fixture modules, and other wired system components and through wireless access point to wireless room controllers and fixture modules.
2. NX Area Controller GUI shall be accessible via conventional PC web browser through the NXAC Series Area Controller's built-in web server.
3. NX Area Controller GUI shall enable users to program, monitor, and administer the NX Lighting Controls System from any location without additional software.
4. NX Area Controller GUI shall include an embedded BACnet IP client that is field configurable, enabling integration of the NX Lighting Controls System and a building automation system.

C. NX Lighting Controls App
   1. NX Lighting Controls App shall provide Bluetooth® wireless setup and configuration of NX system devices and luminaires equipped with an NX In-Fixture Module and smart sensor.
   2. NX Lighting Controls App shall be available in Android and iOS versions for free download from Google Play™ or Apple® App Store.
   3. NX Lighting Controls App shall connect to NX devices via NXBTR/NXBTC modules, NXSMP/NXSMP2 sensors and radio modules via Bluetooth BLE.
   4. NX Lighting Controls App shall enable easy setup and configuration of NX room devices and NX panels.
   5. NX Lighting Controls App shall enable users to create custom schedules and presets.
   6. NX Lighting Controls App shall be able to configure SpectraSync™ or SpectraClean™ enabled luminaires.
   7. NX Lighting Controls App shall globally discover wireless enabled luminaires and devices.
   8. NX Lighting Controls App shall include the IntelliSCOPE™ visual diagnostic tool for real-time calibration and testing of NX digital smart sensors.

2.14 CONDUCTORS AND CABLING

A. Power Supply Side of Remote-Control Power Sources: Comply with network manufacturer's requirements and requirements of Division 26 Section "Low-Voltage Electrical Power Conductors."

PART 3 EXECUTION

3.01 EXAMINATION

A. Prior to installation, contractor shall examine work area to verify measurements, all wire type and routing requirements, and that commencing installation complies with manufacturer's requirements.
B. Where variations from the general specifications or drawings exist, the contractor shall request a clarification prior to rough in or installation

3.02 INSTALLATION

A. Lighting controls shall be installed in accordance with manufacturer’s instructions, guidelines and submittal documents provided by the lighting control manufacturer.
B. Lighting control system components shall only be installed in spaces that meet the following environmental conditions:
   1. Temperature: 32 – 104 deg F (0 - 40 deg C).
   2. Relative Humidity: 10 – 90 percent, noncondensing.
C. All stored and installed lighting control system components shall be adequately protected from dust and dirt.

3.03 SYSTEM STARTUP

A. The system manufacturer shall provide a factory authorized field engineer to the project site after installation has been completed and prior to system energization for the purpose of testing and adjustment of the system.

B. Factory field engineer shall test and verify all system functions and ensure proper operation of the system components in accordance with the specifications and on-site conditions. The installing contractor shall notify the system manufacturer in writing that the system is completely wired and ready to be energized and tested 2 weeks prior to scheduling a field engineer for start-up of the system. Should the field engineer arrive on the job site and find the installation incomplete, the installing contractor shall pay the cost of any future visits by the field engineer required to complete the system start-up.

C. Factory field engineer shall provide a written report of test and outcomes.

3.04 INSTALLATION OF PATHWAYS

A. Conduit, in Addition to Requirements of Section 260533.13:

B. Conduit:

1. Do not install more than 2 (two) 90 degree bends in a single horizontal cable run.
2. Leave pull cords in place where cables are not initially installed.
3. Conceal conduit under floor slabs and within finished walls, ceilings, and floors except where specifically indicated to be exposed.
    a. Conduit may remain exposed to view in mechanical rooms, electrical rooms, and telecommunications rooms.
    b. Treat conduit in crawl spaces and under floor slabs as if exposed to view.
    c. Where exposed to view, install parallel with or at right angles to ceilings, walls, and structural members.
    d. Under floor slabs, locate conduit at 12 inches, minimum, below vapor retarder; seal penetrations of vapor retarder around conduit.

C. Cable Routing

1. All cabling to re routed within approved raceway or above lay-in ceiling. Cabling shall be hidden by ceiling or raceway in all locations of the building with the exception of IDF and MDF rooms or as otherwise noted on the drawings.
    a. Where cable tray is provided, route cabling within cable tray.
    b. Where conduit sleeve is provided, route cabling within conduit sleeve
    c. Above lay-in ceilings, where cable tray or conduit sleeves are not available:
        1) Where raceway for cabling is not provided, Contractor shall run cabling through 2" J hooks.
            (a) J hooks shall be directly attached to building structure at a maximum of 4'-0" center-to-center.
            (b) Additional J hooks will be added as necessary to limit the maximum cable catenary (cable sag) to 12" maximum.
            (c) Install tye-wraps around all J hooks upon completion of cable pulls.
            (d) J hook cable density shall not exceed 60% of the maximum cable count suggested by manufacture. If necessary, provide additional level of J hooks for high cable density runs.
            (e) Contractor shall provide all mounting hardware (threaded rod, unistrut, etc.) Necessary to solidly mounted, complete cable raceway system.

3.05 DEMONSTRATION AND TRAINING

A. Factory field engineer shall instruct owner's staff on how to adjust, operate and maintain lighting systems; and provide instruction using the system software.
B. Allow for up to 4 hours of on-site training on the use and maintenance of the lighting control system to be scheduled at the completion of startup and programming of the system.

3.06 TECHNICAL SUPPORT

A. The lighting controls manufacturer shall provide reasonable access to factory direct telephone technical support during normal business hours.

END OF SECTION

END OF SECTION

SECTION 271000 - STRUCTURED CABLING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Communications system design requirements.
B. Communications pathways.
C. Copper cable and terminations.
D. Communications identification.
E. Data Cabling
F. Fiber Optic Cabling
G. HDMI Cabling
H. Open Racks
I. Distribution frames, cross-connection equipment, enclosures, and outlets.

1.02 RELATED REQUIREMENTS

A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables (600 V and Less).
B. Section 260526 - Grounding and Bonding for Electrical Systems.
C. Section 260533.13 - Conduit for Electrical Systems.
D. Section 260535
E. Section 260537 - Boxes.

1.03 DEFINITIONS

A. BICSI: Building Industry Consulting Service International.
B. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
C. EMI: Electromagnetic interference.
D. IDC: Insulation displacement connector.
E. Ladder Rack: A fabricated structure consisting of two longitudinal side rails connected by individual transverse members (rungs).
F. LAN: Local area network.
G. Outlet/Connectors: A connecting device in the work area on which horizontal cable or outlet cable terminates.
H. RCDD: Registered Communications Distribution Designer.
I. UTP: Unshielded twisted pair.

1.04 COODRINATION OF WORK

A. Contractor shall furnish and install all conduit/raceway as required for the structured cabling distribution system. This includes all raceway explicitly shown on plans or generically required for a complete, functional system.
B. Contractor shall furnish and install all specialty backboxes for devices as required for the structured cabling distribution system. This includes all backboxes explicitly shown on plans or generically required for a complete, functional system.
C. Contractor shall furnish and install all branch circuits required for the structured cabling distribution system as specified. This includes all circuits explicitly shown on plans or generically required for a complete, functional system.

1.05 REFERENCE STANDARDS

A. American National Standards Institute/Telecommunications Industry Association/Electronic Industries Alliance (ANSI/TIA/EIA) ANSI/TIA/EIA-568-B.1 Commercial Building Telecommunications Cabling Standards Part 1: General Requirements, and all associated addenda.
B. ICEA S-90-661 - Category 3 and 5E Individually Unshielded Twisted Pairs, Indoor Cables (With or Without an Overall Shield) for Use in General Purpose and LAN Communication Wiring Systems; 2021.
C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
D. IAC 180 - Illinois Administrative Code 180.
E. TIA-492CAAA - Detail Specification for Class IVa Dispersion-Unshifted Single-Mode Optical Fibers; 1998 (Reaffirmed 2002).
F. TIA-526-7 - Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant, Adoption of IEC 61280-4-2 Edition 2: Fibre-Optic Communications Subsystem Test Procedures – Part 4-2: Installed Cable Plant – Single-Mode Attenuation and Optical Return Loss Measurement; 2015a (Reaffirmed 2022).
G. TIA-526-14 - Optical Power Loss Measurement of Installed Multimode Fiber Cable Plant; IEC 61280-4.1 Edition 3.1, Fiber Optic Communications Subsystem Test Procedures- Part 4-1: Installed Cable Plant- Multimode Attenuation Measurement; 2023d.
H. TIA-568 (SET) - Commercial Building Telecommunications Cabling Standard Set; 2024.
I. TIA-569 - Telecommunications Pathways and Spaces; 2019e, with Addendum (2022).
J. TIA/EIA-568-B.3 - Commercial Building Telecommunications Cabling Standard - Part 3: Optical Fiber Cabling Components Standard, and Addendum 1 - Additional Transmission Performance Specifications for 50/125 um Optical Fiber Cables; Rev B, 2000; Addendum 1.
K. TIA-606 - Administration Standard for Telecommunications Infrastructure; 2021d.
L. TIA-607 - Telecommunications Bonding and Grounding (Earthing) for Customer Premises; 2024e.
M. ANSI/J-STD-607 - Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications; Rev A, 2002.
N. ANSI/TIA/EIA-526 Standard Test Procedures for Fiber Optic Systems, and all associated addenda.
O. ANSI/TIA/EIA-758 Customer-Owned Outside Plant Telecommunications Cabling Standard, and all associated addenda.
P. International Standards Organization/International Electrotechnical Commission (ISO/IEC) DIS 11801, January 6, 1994
Q. American National Standards Institute (ANSI) X3T9.5 Requirements for UTP at 100 Mbps
R. UL 444 - Communications Cables; Current Edition, Including All Revisions.
S. UL 497 - Standard for Protectors for Paired-Conductor Communications Circuits; Current Edition, Including All Revisions.
T. EIA-310-D - Cabinets, Racks, Panels, and Associated Equipment; Electronic Industries Association; 1992
U. UL 50, Cabinets and Boxes
V. UL 1581 - Reference Standard for Electrical Wires, Cables, and Flexible Cords; Current Edition, Including All Revisions.
W. UL 1863 - Communications-Circuit Accessories; Current Edition, Including All Revisions.

X. Work performed should additionally comply with and follow guidelines established in the latest edition/revision, as of the date of the Contract Documents, of the following publications:
   1. BICSI Telecommunications Distribution Methods Manual (TDMM)
   2. BICSI Customer-Owned Outside Plant (CO-OSP)
   3. American National Standards Institute/National Electrical Contractors Association/Building Industry Consulting Service International (ANSI/NECA/BICSI) 568-2001 Standard for Installing Commercial Building Telecommunications Cabling

1.06 SUBMITTALS

A. General:
   1. Reviews of submittals are to establish general conformance to design intent and does not waive contract requirements. Contractor is responsible for dimensions, quantities, mounting accessories, methods of construction, and compliance with the Contract Documents.
   2. Provide separate submittal product data/shop drawings for each fixture, device, and equipment type clearly indicating the type designation per the Contract Documents and all pertinent options and accessories. Do not group similar fixture types together on a single cut sheet. Submittals which do not indicate option data where multiple selections exist will be returned without being reviewed.
B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.
   1. Storage and handling requirements and recommendations.
   2. Installation methods.
C. Shop Drawings: Show compliance with requirements on isometric schematic diagram of network layout, showing cable routings, telecommunication closets, rack and enclosure layouts and locations, service entrance, and grounding, prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
   1. System Labeling Schedules: Electronic copy of proposed labeling schedules and identification plates, in software and format selected by Owner.
   2. Cabling administration drawings and printouts.
D. Evidence of qualifications for installer.
E. Test Plan: Complete and detailed plan, with list of test equipment, procedures for inspection and testing. Submit along with product data.
F. Field Test Reports.
G. Project Record Documents: Prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
   1. Record actual locations of outlet boxes and distribution frames.
   2. Show as-installed color coding, pair assignment, polarization, and cross-connect layout.
   3. Identify distribution frames and equipment rooms by room number on drawings.
H. Operation and Maintenance Data: List of all components with part numbers, sources of supply, and operation and maintenance instructions; include copy of project record documents.

1.07 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.
B. Conform to Illinois Administrative Code 180 and all building codes as listed in IAC section 180.60.
C. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff. Engage an experienced contractor who:

1. Shall be fully capable and experienced in the installation of the communications systems specified, and have a minimum of five (5) years experience on similar systems.
2. Has BICSI-trained and -certified, or equally qualified and certified, installers and technicians on staff and assign them to this project. If personnel of Contractor are not BICSI-trained and -certified, Contractor to submit with bid all necessary credentials and certificates of training for personnel staff for evaluation and determination by CPS OTS Sr. Infrastructure Manager that said credentials and certificates are equal to BICSI standards. The project shall be staffed at all times by Installers and Technicians who, in the role of lead crafts persons, will be able to provide leadership and technical resources for the remaining crafts persons on the project.
3. Shall be certified by the manufacturing company(-ies) in all aspects of installation and testing of the products described within the telecommunications systems specifications. Specifically, those manufacturer(s) whose components constitute a component of the structured cabling system(s) installed as part of the voice and data transport systems. Said certification is to be such that the Contractor is able to offer and fully comply with the requirements to provide Owner with an extended warranty as defined in “System Warranty and Application Assurance” Article of this Section.

D. Installer Supervision:
1. The selected Contractor shall provide a Project Manager to act a single point of contact for all activities performed under this section. The Project Manager shall be a Registered Communications Distribution Designer (RCDD). The RCDD shall have a minimum of 3 years experience in design and installation. The designer must have sufficient experience in this type project(s) as to be able to lend adequate technical support to the field forces during installation, during the warranty period and during any extended warranty periods or maintenance contracts. The Contractor must attach a resume of the responsible designer to the Contractor's response for evaluation.
2. The Project Manager, or designee thereof, shall be required to attend project meetings as required until project closeout/signoff.
3. Should the Project Manager assigned to this project change during the installation, the new Project Manager assigned must meet all qualifications stated in this section, and must also submit a resume for review by the Owner.
4. If, in the opinion of the Owner, the Project Manager does not possess adequate qualifications to support the project, the Owner reserves the right to require the Contractor to assign a designer whom, in the Owner's opinion, possesses the necessary skills and experience required of this project.

E. Materials and equipment shall be the standard product of a manufacturer regularly engaged in the production of the required type of material or equipment for at least five years (unless specifically exempted by the Owner) and shall be the manufacturer's latest design with published properties.

F. Source Limitations: Equipment and materials of the same general type shall be of the same manufacture throughout the project to provide uniform appearance, operation and maintenance.

G. Equipment and materials shall be without blemish or defect.

H. Electrical Components, Devices, and Accessories: Listed and labeled as defined in City of Chicago Electrical Code, by a qualified testing agency, and marked for intended location and application.

I. Comply with NFPA 70 for abandoned cabling.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
B. Do not deliver or install equipment frames and ladder rack until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and work above ceilings is complete.
C. Receive, handle, and store communications system items and materials at the project site. Materials and items shall be placed so that they are protected from damage and deterioration.
D. Stage materials in a secure area of the project site until installation.

1.09 FIBER OPTIC CABLING DESCRIPTION

A. Optical fiber backbone cabling system shall provide interconnections between MDF and the IDF and Concentrator Enclosures in the telecommunications cabling system structure. Cabling system consists of backbone cables, intermediate, mechanical terminations, and patch cords or jumpers used for backbone-to-equipment connections.

1.10 HORIZONTAL CABLING DESCRIPTION

A. Horizontal cable and its connecting hardware provide the means of transporting signals between the communications outlet/connector and the horizontal cross-connect located in the MDF and/or the IDF. This cabling and its connecting hardware are called "permanent link," a term that is used in the testing protocols.
    1. Bridged taps and splices shall not be installed in the horizontal cabling.
B. The maximum allowable horizontal cable length is determined by the communications area serving that link, as follows:
    1. For horizontal cabling served from a Concentrator Enclosure, the maximum allowable length is 141 feet (43 meters).
    2. For horizontal cabling served directly from the MDF <or from IDFs>, the maximum allowable length is 295 feet (90 meters).
        a. The maximum allowable lengths do not include an allowance for patch cords

1.11 PERFORMANCE REQUIREMENTS

A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA/EIA-568-C.2, when tested according to test procedures of this standard.

1.12 WARRANTY

A. General Warranty: The warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under other requirements of the Contract Documents.
    1. Provide a minimum one (1) year warranty for all parts and labor provided under this electrical specifications for all components not covered under the Special Warranty provisions of this Article.
B. The Contractor shall guarantee at the time of the bid that all telecommunications equipment, cabling and components meet or exceed specifications.
C. Special Warranty: Provide to Owner an Extended System and Application Assurance Warranty covering product and installation defects for all passive manufactured components of the

structured cabling system(s) installed as part of the voice and data transport systems. Passive components are defined as those exhibiting no gain or contributing no energy. Warrant to Owner the following:

1. The passive products that comprise the telecommunications structured cabling system will be free from manufacturing defects in material or workmanship under normal and proper use.
2. All approved passive cabling products that comprise the structured cabling system exceed the specification standards and will conform to the performance specifications of the associated product data sheet in effect at the time the product is utilized.
3. The installation will meet, if not exceed, the requirements and the standards for cabling configurations specified in these standards.
4. The Special Warranty shall provided an application assurance guaranteeing structured cabling system shall be capable of running a minimum of Gigabit Ethernet (1000Mbs) in the horizontal channel, and 10-Gigabit Ethernet (10,000Mbs) in the backbone.
5. The Special Warranty shall be applicable to the original site of installation. Under the warranty, the manufacturer will either repair or replace the defective product itself at the manufacturer's cost, or the manufacturer will pay an authorized reseller for the cost to repair or replace any such defective product on behalf of the manufacturer.
6. Transfer manufacturer's warranties to the Owner in addition to the General System Guarantee. Submit these warranties on each item in list form with shop drawings. Detail specific parts within equipment that are subject to separate conditional warranty. Warranty proprietary equipment and systems involved in this contract during the guarantee period. Final payment shall not relieve Contractor of these obligations.
7. Special Warranty shall be held by the product manufacturer(s).
8. Special Warranty Period: 25 years from date of acceptance.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. CATEGORY 6e UTP CABLE AND CONNECTING HARDWARE (Plenum)
   1. Category 6e UTP: Manufacturers of Cable: Subject to compliance with requirements, provide products by one of the following manufacturers:
      a. Hubbell Premise Wiring NEXTSPEED Category 6E cable
      b. Belden Category 6+-Data Twist 4800 UTP Cable
      c. CommScope UltraMedia CS37 6E UTP Cable
   2. Category 6e UTP: Manufacturers of Connecting Hardware and Patch Cords: Subject to compliance with requirements, provide products by one of the following manufacturers:
      a. Hubbell Premise Wiring NEXTSPEED Category 6 Connectivity
      b. Belden KeyConnect Category 6+-Modular Jacks
      c. CommScope Uniprise Category 6 M-Series Jacks
B. OPTICAL FIBER BACKBONE CABLE
   1. Manufacturers: Subject to compliance with requirements of this section, provide products by one of the following manufacturers:
      a. Hubbell Optichannel Enhanced Performance Fiber 10Gig series
      b. Belden FiberExpress 10 Gig Series Fiber
      c. CommScope LazrSPEED fiber
C. Cabling and Equipment:

1. Cable Manufacturers
    a. Hubbell
    b. Belden
    c. CommScope
2. Modular Jack Manufacturers
    a. Hubbell
    b. Belden
    c. CommScope

2.02 SYSTEM DESIGN

A. Provide a complete permanent system of cabling and pathways for voice and data communications, including cables, conduits and wireways, pull wires, support structures, enclosures and cabinets, and outlets.
    1. Comply with TIA-568 (SET) (cabling) and TIA-569 (pathways) (commercial standards).
    2. Provide fixed cables and pathways that comply with NFPA 70 and TIA-607 and are UL listed or third party independent testing laboratory certified.
    3. In this project, the term plenum is defined as return air spaces above ceilings, inside ducts, under raised floors, and other air-handling spaces.
B. Main Distribution Frame (MDF): Centrally located support structure for terminating horizontal cables that extend to telecommunications outlets, functioning as point of presence to external service provider.
    1. Locate main distribution frame as indicated on the drawings.
    2. Capacity: As required to terminate all cables required by design criteria plus minimum 25 percent spare space.
C. Intermediate Distribution Frames (IDF): Support structures for terminating horizontal cables that extend to telecommunications outlets.
    1. Locate intermediate distribution frames as indicated on the drawings.
D. Backbone Cabling: Cabling, pathways, and terminal hardware connecting intermediate distribution frames (IDF's) with main distribution frame (MDF), wired in star topology with main distribution frame at center hub of star.
E. Cabling to Outlets: Specified horizontal cabling, wired in star topology to distribution frame located at center hub of star; also referred to as "links".

2.03 PATHWAYS

A. Conduit: As specified in Section 260533.13; provide pull cords in all conduit.

2.04 COPPER CABLE AND TERMINATIONS

A. Camera and Data Cabling - 6e
    1. Horizontal Cable
        a. Cable
            1) Copper Horizontal Cable: TIA/EIA-568 Category 6e solid conductor unshielded twisted pair (UTP), 24 AWG, 100 ohm; 4 individually twisted pairs; covered with Color as Noted Below jacket and complying with all relevant parts of and addenda to latest edition of TIA/EIA-568 and UL 444.
                (a) Provide NFPA 70 type CMP plenum-rated cable.
        b. Jacks and Connectors

(a) Color: As Noted Below

(1) Color: Front face of jack shall be colored. Use of a color-coded icon insert on a neutral-color jack shall not be acceptable.

(b) Performance: 500 mating cycles.

(c) Data Jacks: 4-pair, pre-wired to T568A configuration, with color-coded indications for T568B configuration.

B. Category 6e UTP: Patch Cords: Factory-made, four-pair cables terminated with eight-position modular plug at each end.

1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6e performance.
   a. Patch cords shall have latch guards to protect against snagging.
   b. Jack Modules shall comply with TIA/EIA-568-C.2.
   c. Patch cords shall be 28 AWG and shall support POE up to and including 802.3bt.
2. Patch Cord plug modules shall comply with ANSI/TIA-968-A requirements. Patch cords shall be of same manufacturer and consistent with components and performance level of cross-listed solutions indicated in this Article.
3. Color: Coordinate with UTP cable color per system application.
4. Quantity to be provided:
   a. Work Area: Provide one (1) 6-ft patch cord for each Category 6 UTP outlet installed per system application.
   b. Equipment End:
      1) Data Racks:
         (a) Provide (1) 5-ft patch cord for one-half (fifty-percent) of the total number of Category 6 and/or 6a UTP outlets installed per system application.
         (b) Provide (1) 7-ft patch cord for one-half (fifty-percent) of the total number of Category 6 and/or 6a UTP outlets installed per system application.
5. Delivery & Turn-over: Notify District Sr. Infrastructure Manager when patch cords have been delivered to project site. Deliver patch cords to site at least one week prior to substantial completion and store in locked, secure MDF room, or other locked, secure room as coordinated with Owner, until turn-over to district information technology manager personnel. Contractor is responsible for all patch cords until direct turn-over to district information technology manager.

C. Colors

1. Data
   a. Cable: Blue
   b. Jack: Blue
2. Camera
   a. Cable: Red
   b. Jack: Red

2.05 OPTICAL FIBER BACKBONE CABLE

A. General Description: Multimode, 50/125-micrometer, nonconductive, tight buffer (unless noted otherwise), optical fiber cable.

1. Comply with ICEA S-83-596 for mechanical properties (unless noted otherwise).
2. Comply with TIA/EIA-568-C.3 for performance specifications.

3. Comply with TIA/EIA-492AAAD for detailed specifications.
4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651,for the following types:
    a. Plenum rated, nonconductive: Type OFNP
5. Comply with IEEE 802.3ae standard for 10 GB Ethernet transmission at 850nm window.

B. Jacket:
1. Jacket Color: Aqua (unless noted otherwise)
2. Cable cordage jacket, fiber, unit, and group color shall be according to TIA/EIA-598-B.
3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches.

C. Indoor 10G/300M Multimode Fiber-Optic Cable (OM3): 50/125-micrometer, laser-optimized multimode optical fiber, capable of 10-Gigabit Ethernet transmission up to 984 feet (300 meters), for use in indoor-applications only.
1. Strand Count: as noted on drawings (MDF to enclosures);
2. Maximum Attenuation: 3.00 dB/km at 850 nm; 1.0dB/km at 1300 nm.
3. Minimum Effective Modal Bandwidth: 2000 MHz-km at 850 nm; 500 MHz-km at 1300 nm, as characterized by DMD measurement per EIA/TIA-455-220

D. Indoor 10G/550M Multimode Fiber-Optic Cable (OM4): 50/125-micrometer, laser-optimized multimode optical fiber, optimized for VCSEL-based transmission of 10-Gigabit Ethernet up to 1804 feet (550 meters), for use in indoor-applications only.
1. Strand Count: as noted on drawings (MDF to enclosures);
2. Maximum Attenuation: 3.0 dB/km at 850 nm; 1.0dB/km at 1300 nm.
3. Minimum Effective Modal Bandwidth: 4700 MHz-km at 850 nm; 500 MHz-km at 1300 nm, as characterized by DMD measurement per EIA/TIA-455-220.

E. All fiber optic cables shall be aluminum interlocking armor with an overall jacket.

2.06 IDENTIFICATION PRODUCTS

A. Comply with TIA-606.

2.07 CROSS-CONNECTION EQUIPMENT

A. Connector Blocks for Category 3 Cabling: Type 66 insulation displacement connectors; capacity sufficient for cables to be terminated plus 25 percent spare.

B. Patch Panels for Copper Cabling: Sized to fit EIA standard 19 inch wide equipment racks; 0.09 inch thick aluminum; cabling terminated on Type 110 insulation displacement connectors; printed circuit board interface.
1. Jacks: Non-keyed RJ-45, suitable for and complying with same standard as cable to be terminated; maximum 48 ports per standard width panel.
    a. Category rating to match category of specified jack (see horizontal cabling).
    b. Jack color shall match the color of specified user jack (see horizontal cabling).
2. Capacity: Provide ports sufficient for cables to be terminated plus 25 percent spare.
3. Labels: Factory installed laminated plastic nameplates above each port, numbered consecutively; comply with TIA/EIA-606 using encoded identifiers.
4. Provide incoming cable strain relief and routing guides on back of panel.
5. Provide full height (min 2U) patch cord organizers for each patch panel
    a. Minimum 2U height
    b. Panel material: 16 ga cold-rolled stee

c. cover mateiral: 16 ga cold-rolled steel
d. Ring: 0.225" diamter steel road
e. Black power coat
f. Front and rear rings
g. Front and rear cover

6. Patch Cords: Provide one patch cord for patch panel port.

C. Optical fiber connecting hardware
1. Cable Connecting Hardware: Comply with Optical Fiber Connector Intermateability Standards (FOCIS) specifications of TIA/EIA-604-2, TIA/EIA-604-3-A, and TIA/EIA-604-12. Comply with TIA/EIA-568-B.3.
2. Fiber Optic Termination Housing: Rack-mount, with multi-numbered, duplex connector insert adapter panels holding fiber optic strand connectors.
a. Size - Concentrator Enclosures: (1) rack unit height; sized to accommodate a total of three (3) adapter panels.
b. Size - MDF/IDF: (2) rack units height, sized to accommodate at least six (6) adapter panels.
c. Be modular in design with management clips that provide slack storage to comply with optical fiber bend radius and the recommended slack storage length.
d. Be equipped with pull out tray for front access to fiber terminations and rear of adapter panels.
e. Adapter Panels: Housing to be fitted out with adapter panels, each minimally able to accommodate twelve (12) or twenty-four (24) duplex LC couplers (12 or 24 strands total), with blank adapter panels at all unused housing panel slots. Provided quantity as necessary to accommodate quantity of fiber optic cables served by housing.
f. Adapter panel face shall be recessed into housing, behind a front mounted door. Door shall secure to enclosure using a keyed lock, clasp or tab insert.
g. Have an administrative labeling system for identification of individual fiber ports.
h. Have anchor points and strain relief for the optical fiber cable entry to the unit.

D. Fiber Patch Cords:
1. Patch cords shall be of same manufacturer and consistent with components and performance level of cross-listed solutions indicated in this Section.
2. Factory-made, dual-fiber.
3. Specification of fiber optic patch cord to match fiber optical backbone served by cord.
a. Multimode, including 10 Gigabit Ethernet transmission requirements for laser-optimized 50/125 micrometer multimode fiber optic cabling.
4. Connectorization: Type LC to Type LC
5. Connectorization (from existing IDF to new wall mounted camera system IDFs): SC to LC (determine lenght required in field)
6. Jacket Color: Aqua
7. Quantity: Provide two (2) patch cords for each optical fiber backbone cable installed on project, as follows:
a. One (1) in 1-meter length
b. One (1) in 2-meter length

E. Optical Cable Connectors
1. Field-terminated, mechanical splice, factory pre-polished, simplex and duplex, Type LC connectors. Insertion loss, typical 0.17 dB; color: aqua.

2. LC splice on connectors shall be permitted
3. Adaptors: As specified above under FIBER OPTIC CABLING; maximum of 24 duplex adaptors per standard panel width.
4. Fusion splice cassettes with pigtails shall be permitted.
5. Labels: Factory installed laminated plastic nameplates above each port, numbered consecutively; comply with TIA/EIA-606 using encoded identifiers.
6. Provide incoming cable strain relief and routing guides on back of panel.
7. Provide rear cable management tray at least 8 inches deep with removable cover.
8. Provide dust covers for unused adaptors.
9. Patch Cords: Provide one patch cord for each patch panel port.

2.08 **HDMI DISTRIBUTION SYSTEM**

A. Final wall mounted connector shall be female to female pass through type.
B. Hubbell Plug N Play or equal
C. Verify connection type/method and raceway capacity based upon submitted cables and jacks.

2.09 ENCLOSURES

A. Size: As indicated on drawings.
B. Do not paint over UL label.
C. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:
   1. Eaton B-Line, Inc.
   2. Chatsworth Products, Inc.
   3. AMCO, an IMS Company
   4. Hubbell Inc., Hubbell Premise Wiring
   5. Eaton RS Enclosures
   6. MiniRaQ, Black Hawk Labs
D. Racks and Cabinets: All shall be keyed alike
   1. MDF
      a. Racks (Open bay): EIA-310-D standard 19 inch wide component racks.
         1) 4 post, 2' deep minimum. Verify depth with required equipment and space in room.
         2) All data/network cabinets shall be open bay relay racks designed in accordance with EIA RS-310c STANDARDS (19"). The racks shall be constructed of aluminum with durable black polyurethane or mill finish designed for 19" rack mount equipment. Racks shall be 84" high.
            (a) 16 gage steel construction with corrosion resistant finish; vertical and horizontal cable management channels, top and bottom cable troughs, and grounding lug.
            (b) Vertical U-channel
            (c) 6.5" channel depth (unless specified on drawing as 16" channel depth)
            (d) EIA hole pattern front and rear.
            (e) 6” and 10” vertical cable managers as specified by the drawings.

(f) Floor and ceiling cable access for routing and management of distribution cables.
(g) Ladder rack shall be securely attached to top of cabinets and wall to provide cable raceway path and structural support.
(h) All TR racks shall be secured to floor through approved anchors.
(i) Slotted ducts for cable management
(j) Each rack shall include 1 prewired AL4000BC raceway with 12 5-20R duplex receptacles

2. IDFs (all IDFs receive new wall mounted racks for camera equipment electronics and wiring)
   a. WIRE MANAGEMENT PANELS
      1) Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:
         (a) Eaton B-Line, Inc.
         (b) Chatsworth Products, Inc.
         (c) AMCO, an IMS Company
         (d) Hubbell Premise Wiring, Hubbell Inc.
      2) Vertical wire management panels: Double-sided, steel or aluminum, vertical panels mounted to side of communications floor-mounted racks, providing for front and rear management of horizontal and backbone cable in-feeds and equipment patch cords.
         (a) Vertical Managers shall be "finger" style, consisting of a series fingers with overall covers. Plastic "routing" rings or "covered-slotted duct" management panel styles are not permitted.
         (b) Dimensions: 45 rack-units high and 6" wide on the unattached ends (ends of rack rows) and 10" wide on attached ends (where multiple racks butt up together).
         (c) Maximum 12" spacing between latches or fingers.
         (d) Finish: Black
         (e) A vertical management section shall be provided for each individual rack. Coordinate quantity with Contract Drawings, and location of electrical surface raceway for power receptacles. If more than one rack is installed in a row, a single vertical management section may be used to adjoin two racks.
      3) Horizontal wire management panels: Double-sided, steel or aluminum, horizontal channels mounted to vertical rails of communications floor-mounted racks or concentrator enclosures, providing for front and rear management of horizontal cable in-feeds and equipment patch cords.
         (a) Panels must be "finger" style, consisting of a series of plastic fingers, with an overall cover. Plastic "routing" rings or "covered-slotted duct" management panel styles are not permitted.
            (1) COORDINATE WIRE MANAGEMENT SIZES AND POSITIONS IN CONTRACT DRAWINGS.

(b) Height: [1] [2] or [4] rack units high as indicated in Contract Drawings.
(c) Provide horizontal wire management panels above and below all horizontal cable patch panels and other termination housings.
(d) Provide horizontal wire management panels above and below open rack units dedicated to future network electronics, as indicated in Contract Drawings.
(e) Finish: Black

2.10 LADDER RACK RUNWAY

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:
   1. Eaton B-Line, Inc.
   2. Chatsworth Products, Inc.
B. Materials: Steel, suitable for indoors and protected against corrosion by power-coat paint finish.
   1. Finish Color: Black
   2. Feature rounded edges and smooth surfaces.
C. Sizes and Configurations: Nominally 12 inches wide, and a rung spacing of 6 to 12 inches on center, unless otherwise indicated in Contract Drawings. Standard Length: 9'-11-1/2".
D. Rungs and Rails: Nominally 1" x 1/2" or 3/8" tubular steel rungs, featuring rounded edges, welded to 1-1/2" or 2" longitudinal rails (stringers).
E. Packaging: Individually boxed to prevent scratches and damage.

2.11 LADDER RACK RUNWAY ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:
   1. Cooper B-Line, Inc.
   2. Chatsworth Products, Inc.
B. Finish:
   1. Powder coat paint, Black
   2. Electroplated zinc galvanized, complying with ASTM B 133, Type 1.
C. Fittings: Tees, crosses, risers, bends, elbows, wall mounting brackets, rack-to-runway brackets, corner and butt splice brackets, mounting clips and all other appurtenances and fittings as necessary to form a complete and functional runway system within MDF [and IDF].
D. Bonding strap: Flexible tinned copper flat braid or #6 AWG insulated stranded copper conductor, minimum 8" length, with two-hole compression lugs and nuts/washers, to provide grounding connection between ladder rack runway segments.
E. Supports: Comply with requirements of Division 16 section "Hangers and Supports."

2.12 LABEL IDENTIFICATION PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:
   1. Brady Corporation
   2. 3M
   3. Panduit Corporation

B. Cable/wire markers shall be self adhesive, self laminating mechanically printed with a clear protective laminating over wrap or protective heat-shrink tubing.
C. Comply with TIA/EIA-606-A and UL 969 for labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

PART 3 EXECUTION

3.01 DELIVERY AND STORAGE

A. Receive, handle, and store communications system items and materials at the project site. Materials and items shall be placed so that they are protected from damage and deterioration.
B. Stage materials in a secure area of the project site until installation.

3.02 INSTALLATION - GENERAL

A. The drawings for work under telecommunications specification sections related to communication systems are diagrammatic and are intended to convey the scope of work and indicate the general arrangement of outlets, equipment, termination hardware, fixtures and other work included in the Contract.
B. Location of items required by the drawings or specifications not definitely fixed by dimensions are approximate only and exact locations necessary to secure the best conditions and results shall be determined at the site and shall be subject to the approval of the Owner.
C. Follow drawings in laying out work, check drawings of other trades to verify spaces in which work will be installed, and maintain maximum headroom and space conditions at all points.
    1. Where headroom or space conditions appear inadequate, the Owner shall be notified before proceeding with installation.
    2. Minor rerouting and changes in location shall be made at no additional cost to the Owner.
    3. Coordinate the mounting heights of communications equipment and raceways to clear the opening heights of doors and the heights of equipment which needs to be removed and replaced.
    4. As necessary, adjust elevations of rack-mounted termination hardware and horizontal wire management panels so as to compensate for rack unit sizes of actual hardware used, as compared to hardware rack unit sizes depicted in Contract Drawings.
D. Perform all work with skilled mechanics of the particular trade involved in a neat and workmanlike manner.
E. Perform all work in cooperation and coordination with other trades and schedule.
F. Furnish other trades advance information on locations and sizes of frames, boxes, sleeves and openings needed for the work, routes for conduit, and also furnish information and shop drawings necessary to permit trades affected to install their work properly and without delay.
G. Where there is evidence that work of one trade will interfere with the work of other trades, all trades shall assist in working out space allocations to make satisfactory adjustments and shall be prepared to submit and revise coordinated shop drawings.
H. With the approval of the Owner and without additional cost to the Owner, make minor modifications in the work as required by structural interferences, by interferences with work of other trades or for proper execution of the work.
I. Work installed before coordinating with other trades so as to cause interference with the work of such other trades shall be changed to correct such condition without additional cost to the Owner and as directed by the Owner.
J. Minor changes in the locations of outlets, fixtures and equipment shall be made prior to rough in at the direction of the Owner and at no additional cost to the Owner.

K. Contractor shall cooperate with other trades and coordinate work so that conflicts with other work are eliminated.

L. Equipment shall be installed with adequate space allowed for removal, repair or changes to equipment. Ready accessibility to removable parts of equipment and to wiring shall be provided without moving other equipment which is to be installed or which is in place. Contractor shall verify measurements. Discrepancies shall be brought to the Owner's attention for interpretation.

M. Determine temporary openings in the buildings that will be required for the admission of apparatus furnished under this Division, and notify the Owner accordingly. In the event of failure to give sufficient notice in time to arrange for these openings during construction, assume all costs of providing such openings thereafter.

N. Location of communication outlets and raceway pathways are approximate and exact locations shall be determined on site.

O. Contractor shall refer to contract documents for details, reflected ceiling plans, and large scale drawings.

P. Comply with Communication Service Provider requirements.

Q. Grounding and Bonding: Perform in accordance with TIA-607 and NFPA 70.

R. INSTALLATION OF CABLES

1. Comply with NECA 1.
2. General Requirements for Cabling:
    a. Comply with TIA/EIA-568-C.2.
    b. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
    c. Install 110-style IDC termination hardware unless otherwise indicated.
    d. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
    e. Cables may not be spliced. Secure and support cables not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals. Do not over-cinch or crush cables.
    f. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
    g. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than 4X cable diameter. Install lacing bars and distribution spools.
    h. Hook and loop (Velcro)-style cable ties shall be used to bundle and secure exposed cables in MDF/IDF rooms. Use of plastic cable ties is not permitted.
    i. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
    j. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
    k. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions, and do not exceed manufacturer's recommended cable pull tension.
        1) When installing in conduit, use only lubricant approved by cable manufacturer and do not chafe or damage outer jacket.
    l. Service Loops: Provide the following minimum extra length of cable, dressed and routed neatly:

1) At MDF/IDF frames: 60 inches, neatly installed in vertical wire manager or accommodated by additional routing around overhead ladder rack runway.
2) At Surface Raceway Outlets - Copper: 12 inches, neatly installed in surface raceway channel.

3. UTP Cable Installation:
   a. Comply with TIA/EIA-568-C.2.
   b. Maintain pair twists as close as possible to point of termination, but do not untwist UTP cables more than 1/8 (.125) inch from the point of termination to maintain cable geometry.
   c. Concentrator Enclosures: No cabling is to be routed down through the center area of the enclosure so as to inhibit the installation of network electronics.
   d. MDF/IDF: Install and route cabling on overhead ladder rack runway and within horizontal and vertical cable guides to terminating hardware.
4. Group connecting hardware for cables into separate logical fields.
5. Optical Fiber Cable Installation:
   a. Comply with TIA/EIA-568-C.3.
   b. Cables shall terminate with LC-type connectors secured in connecting hardware that is rack or enclosure mounted.
   c. Concentrator Enclosures: No cabling is to be routed down through the center area of the enclosure so as to inhibit the installation of network electronics.
   d. MDF/IDF: Install and route cabling on overhead ladder rack runway and within horizontal and vertical cable guides to terminating hardware.
6. Separation from EMI Sources:
   a. Comply with BICSI TDMM and TIA/EIA-569-A for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
   b. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
      1) Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches.
      2) Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches.
      3) Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches.
   c. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
      1) Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
      2) Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches.
      3) Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches.
   d. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
      1) Electrical Equipment Rating Less Than 2 kVA: No requirement.
      2) Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches.
      3) Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches.
   e. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches.

f. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches.

S. INSTALLATION OF CABINET RACKS AND ENCLOSURES

1. Comply with NECA 1.
2. Install all communications hardware components in accordance with project specifications and plan, elevation, and layout information within Contract Drawings.
3. The contractor shall coordinate the installation of communications cabinets, racks and enclosures with the installation of the communications pathways and cabling to eliminate any potential damage to cables, or any other installed communications components or equipment.
4. Backboards: Install plywood with “A” side outward and at elevation and wall location(s) as indicated in Contract Drawings. Butt adjacent sheets tightly, and form smooth gap-free corners. Cover fire-rating mark during painting. Remove cover afterwards, leaving mark exposed for subsequent inspection by authority having jurisdiction.
5. Communications Floor-mounted Racks: Assemble and install in accordance with manufacturer's instructions and recommendations. Racks shall be assembled such that mounting rails are exactly perpendicular to the base.
   a. Secure to floor utilizing lag bolts or masonry anchors, and washers, appropriate to application and flooring condition. The use of a Tapcon, or equal, masonry screw with washer is not acceptable. Secure at all four locations of rack base.
   b. Secure each communications floor-mounted rack to overhead ladder rack using eack-to-runway mounting plates, brackets, j-bolts, nuts/washers, etc., installed in compliance with manufacturer's instructions and recommendations.
6. Wire management panels: Secure to communication relay racks in accordance with manufacturer's instructions.

3.03 PATHWAY EXAMINATION

A. Examine pathway elements intended for cables.
   1. Verify proposed routes of pathways. Check raceways, ladder racks, and other elements for compliance with space allocations, clearances, installation tolerances, hazards to cable installation, and other conditions affecting installation. Verify that cabling can be installed complying with EMI clearance requirements.
   2. Prepare wall penetrations and verify that penetrations of rated fire walls are made using products labeled for type of wall penetrated.
   3. Identify plan to support cables and raceways in suspended ceilings. Verify weight of individual types and sizes of cables. Verify that load capacity of cable support structures is adequate for each pathway.
   4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.04 INSTALLATION OF PATHWAYS

A. Underground Service Entrance: Install conduit at least 18 inches below finish grade; encase in at least 3 inches thick concrete for at least 60 inches out from the building line.
B. Install pathways with the following minimum clearances:
   1. 48 inches from motors, generators, frequency converters, transformers, x-ray equipment, and uninterruptible power systems.
   2. 12 inches from power conduits and cables and panelboards.
   3. 5 inches from fluorescent and high frequency lighting fixtures.

4. 6 inches from flues, hot water pipes, and steam pipes.

C. Conduit, in Addition to Requirements of Section 260533.13:

D. Conduit:
   1. Do not install more than 2 (two) 90 degree bends in a single horizontal cable run.
   2. Leave pull cords in place where cables are not initially installed.
   3. Conceal conduit under floor slabs and within finished walls, ceilings, and floors except where specifically indicated to be exposed.
      a. Conduit may remain exposed to view in mechanical rooms, electrical rooms, and telecommunications rooms.
      b. Treat conduit in crawl spaces and under floor slabs as if exposed to view.
      c. Where exposed to view, install parallel with or at right angles to ceilings, walls, and structural members.
      d. Under floor slabs, locate conduit at 12 inches, minimum, below vapor retarder; seal penetrations of vapor retarder around conduit.

E. Cable Routing
   1. All cabling to re routed within approved raceway or above lay-in ceiling. Cabling shall be hidden by ceiling or raceway in all locations of the building with the exception of IDF and MDF rooms or as otherwise noted on the drawings.
      a. Where cable tray is provided, route cabling within cable tray.
      b. Where conduit sleeve is provided, route cabling within conduit sleeve
      c. Above lay-in ceilings, where cable tray or conduit sleeves are not available:
         1) Where raceway for cabling is not provided, Contractor shall run cabling through 2" J hooks.
            (a) J hooks shall be directly attached to building structure at a maximum of 4'-0" center-to-center.
            (b) Additional J hooks will be added as necessary to limit the maximum cable catenary (cable sag) to 12" maximum.
            (c) Install tye-wraps around all J hooks upon completion of cable pulls.
            (d) J hook cable density shall not exceed 60% of the maximum cable count suggested by manufacture. If necessary, provide additional level of J hooks for high cable density runs.
            (e) Contractor shall provide all mounting hardware (threaded rod, unistrut, etc.) Necessary to solidly mounted, complete cable raceway system.

3.05 FIRESTOPPING

A. Utilize an approved firestop assembly to seal all cable and raceway penetrations of fire-rated floor and wall assemblies. Assembly must achieve the same smoke/fire-resistance rating as the floor or wall being penetrated.

B. Through-Penetration Firestop Systems: Sleeves through fire walls
   1. Utilize Hilti CP 653 BA Firestop Speed Sleeve: 4"

C. Comply with TIA/EIA-569-A, Annex A, "Firestopping."

D. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.06 GROUNDING

A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
B. Comply with ANSI-J-STD-607-A.
C. Coordinate location of communications grounding bus bar to minimize the length of bonding conductors.
D. Bond metallic equipment to the communications grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.
E. Bond each segment of ladder rack runway using bonding straps. Ladder rack connection fittings are not considered an acceptable bonding mechanism. Install bonding straps in accordance with manufacturer's instructions and recommendations.
F. Bond metallic equipment to the communications grounding bus bar in MDF [or IDF], using not smaller than No. 6 AWG equipment grounding conductor.
    1. Ground ladder rack system to communications grounding bus bar.
    2. Ground each floor-mounted rack to communications grounding bus bar. Bonding to overhead ladder rack is not a permissible.
    3. Ground each concentrator enclosure to communications grounding bus bar. At enclosure, terminate equipment grounding conductor to grounding bus bar located within enclosure.
G. ESD Port Kit: Install ESD port kit in accordance with manufacturer's instructions and recommendations, on communications mounting elements as follows:
    1. Floor-mounted racks: Mount a kit directly to both the front and the rear sides of the right vertical mounting rail of the center most rack in MDF [and the center most rack in IDF], at 48” above floor, using thread-forming screw and antioxidant compound. Coordinate exact location with Owner.

3.07 IDENTIFICATION

A. All labeing standards will be determined in conjuction with the district information technology administrator. The district technology administrator shall have final approval on all labeling schemes. Labeling schemes applied without approval shall be replaced/modified to comply.
B. Labeling shall minimually comply with EIA/TIA labeling standards.
C. LABELING HIERARCHY
    1. When labeling communications cabling and pathways always begin the labeling scheme with the room or location of greater significance.
    2. Consult with district Sr. Infrastructure Manager for clarifications regarding application of hierarchy table to the project. Hierarchy relationships that must be adhered to include, but are not limited to:
        a. Cabling and/or pathways between the MDF and any IDFs must list the MDF first.
        b. Cabling and/or pathways between a concentrator enclosure and the work area must list the concentrator enclosures first.
        c. Cabling and/or pathways between an MDF or IDF and a wireless access point outlet must list the MDF or IDF first.
    3. Labeling must be the same on both ends of the cable and/or pathway.
    4. Labeling for all communications infrastructure elements shall be consistent across the installation. Coordinate with requirements for labels and identification defined in Contract Drawings.
D. WIRE IDENTIFICATION

1. Cable/wire markers shall be installed within four (4) inches of each end of the cable, and where cable is accessible in junction or pull boxes. Information list on cable/wire marker shall include, but is not limited to:
    a. Cable and type
    b. Termination hardware
    c. Termination position
2. Identification within Connector Fields in MDF, [IDFs,] and concentrator enclosures: Label each connector and each discrete unit of cable-terminating and connecting hardware.

E. WORKSTATION LABELING
1. Administration at the work area / workstation will be carried out in proximity to the closest Distribution Frame (MDF, IDF).
2. The administration of the individual Data/Voice locations will reference the MDF or ID room location.
3. Administration of the individual jack locations will be used for local tracking or tracing of the patch panel termination points (Data/Voice jacks back to the closest termination in the Distribution Frame). Typical numbering of the jack locations will begin with the termination point closest to the Distribution Frame and continuing in numerical series outward from that location.

3.08 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit communications systems installation, including all pathway elements and supports necessary for same. Perform cutting by skilled mechanics of trades involved. Perform work so as to not impair structural stability of building construction and systems.
B. Conduits passing through roofs or other surfaces exposed to weather shall be properly flashed as specified in roofing and waterproofing sections. This flashing work shall be part of this division of work.
C. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new firestopping where existing firestopping has been disturbed during the course of install. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

3.09 REFINISHING AND TOUCHUP PAINTING

A. Refinish and touch up paint. Paint materials and application requirements are specified in Section "Painting."
1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.
3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.10 CLEANING

A. On completion of installation inspect exposed finishes. Remove burrs, dirt, paint spots, and construction debris. Repair damaged finish(es), including chips, scratches, and abrasions.

B. All equipment, hardware and finishes shall be cleaned prior to final acceptance. Unless otherwise indicated, clean shall mean free of dust, dirt, mud, debris, oil, grease, residues, and contamination.

C. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion. Protect conduit and wireway openings against the entrance of foreign matter by means of plugs or caps. Cover fixtures, materials, equipment and devices furnished or installed under this section or otherwise protect against damage, both before and after installation. Hardware, materials, equipment, or devices damaged prior to final acceptance of the work shall be restored to their original condition or replaced.

D. During the course of communications installation work, provide for on-going proper disposal of all debris, including but not limited to: equipment packaging and shipping materials, shipping pallets, empty cable reels/boxes, cable cuttings, etc. The Contractor shall, at all times, keep the site free from accumulations of waste material or rubbish caused by its employees or work. Remove all crates, cartons, and other waste materials or trash from the working areas at the end of each working day. Flammable waste material must be removed from the working areas at the time of generation. All rubbish and debris, combustible or not, shall be discarded in covered metal containers daily and removed from the premises at least weekly and legally disposed of.

3.11 COMMISSIONING AND DEMONSTRATION

A. INSPECTION

1. Visually inspect UTP and optical fiber cable jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568-B.1.
2. Visually confirm Category 6 marking of outlets, outlet/connectors, and patch panels for horizontal UTP cabling for Data/Wireless, Kronos and MMTV applications.
3. Visually confirm Category 5e marking of outlets, outlet/connectors, termination blocks and patch panels for horizontal UTP cabling voice and 25-pair Category 5e backbone applications.
4. Visually confirm Category 3 marking of copper backbone UTP cables for indoor voice backbone applications.
5. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
6. Inspect cable terminations for color coded labels of proper type.

B. FIELD QUALITY CONTROL

1. Perform tests and inspections.
2. Copper UTP Cable Tests:
    a. Copper UTP Test Instruments:
        1) Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for permanent link test configuration.
        2) For horizontal UTP cable certification tests, use a Level III tester.
    b. Copper Backbone UTP Cable Tests:

1) Test copper backbone UTP cabling for DC loop resistance, shorts, opens, intermittent faults, polarity between conductors, and for insertion loss (attenuation). Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.

c. UTP Performance Tests:

1) Test permanent link for each outlet. Perform the following tests according to TIA/EIA-568-B.1 and TIA/EIA-568-B.2:

(a) Wire map.

(b) Length (physical vs. electrical, and length requirements).

(c) Insertion loss.

(d) Near-end crosstalk (NEXT) loss.

(e) Power sum near-end crosstalk (PSNEXT) loss.

(f) Equal-level far-end crosstalk (ELFEXT).

(g) Power sum equal-level far-end crosstalk (PSELFEXT).

(h) Return loss.

(i) Propagation delay.

(j) Delay skew.

2) Testing for Category 6 horizontal UTP must additionally report values for attenuation-to-crosstalk ratio (ACR), and power sum attenuation-to-crosstalk ratio (PSACR).

3) A star (“*”) passing shall not be considered acceptable.

3. Optical Fiber Cable Tests:

a. Optical Fiber Test Instruments:

1) Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

b. Optical Time Domain Reflectometry Tests: After terminating optical fiber cables, one individual fiber from each backbone cable installed shall be tested using an optical time domain reflectometer (OTDR). Perform OTDR testing in accordance with manufacturer's recommended test procedures. Test to determine the installed length, continuity, and OTDR-based attenuation measurement. Provide test report identifying backbone cable identification and indicating corresponding values from tests.

c. Link End-to-End Attenuation Tests: Perform optical fiber end-to-end link tests according to TIA/EIA-568-B.1 and TIA/EIA-568-B.3.

1) Multimode backbone link measurements: Test at 850 or 1300 nm in both directions according to TIA/EIA-526-14-A, Method B, One Reference Jumper.

2) Attenuation test results shall be less than that calculated according to equation in TIA/EIA-568-B.1.

3) These readings must not be higher than the "Optimal Attenuation Loss (OAL)". The OAL will be calculated using the manufacturer's factory certified test results, (db/km) adjusted for the actual installed lengths (dBs) plus the manufacturer's best published attenuation losses for the connector on this project

and/or splice installed on this project (0.25dB for Connectors and 0.10dB for splices).

4) Link End-to-End Attenuation Test reports shall include:
   (a) Cable identification and Strand numbers
   (b) The OAL value for each link
   (c) The theoretical maximum attenuation value, per TIA/EIA-568-B.1, for each link
   (d) Tested values for attenuation

4. Document data for each measurement. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.
5. End-to-end cabling will be considered defective if it does not pass tests and inspections. Correct failures and retest to demonstrate compliance; otherwise, remove and replace with new components and retest to demonstration compliance with requirements.
6. Prepare test and inspection reports.

END OF SECTION

SECTION 275124 - NEW WIRELESS MASTER CLOCK SYSTEM

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Master Clock equipment.
B. Accessories.

1.02 RELATED SECTIONS

A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables (600 V and Less).
B. Section 260526 - Grounding and Bonding for Electrical Systems: Electrical system grounding and bonding.
C. Section 260534 - Conduit.
D. Section 260537 - Boxes.

1.03 REFERENCES

A. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
B. IAC 180 - Illinois Administrative Code 180.

1.04 COORDINATION OF WORK

A. Contractor shall furnish and install all conduit/raceway as required for the master clock system. This includes all raceway explicitly shown on plans or generically required for a complete, functional system.
B. Contractor shall furnish and install all specialty backboxes for devices as required for the imaster clock system. This includes all backboxes explicitly shown on plans or generically required for a complete, functional system.
C. Contractor shall furnish and install all branch circuits required for the master clock system as specified. This includes all circuits explicitly shown on plans or generically required for a complete, functional system.

1.05 RELATED DOCUMENTS

A. The general conditions, supplementary conditions, and general requirements are to apply to the work specified In this section.
B. All bids shall be based on the equipment features and functions as specified herein.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.
B. Conform to Illinois Administrative Code 180 and all building codes as listed in IAC section 180.60.
C. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this Section with minimum three years of documented experience.
D. Supplier Qualifications: Company authorized by manufacturer and specializing in supplying products specified in this Section with minimum three years documented experience.
E. Installer Qualifications: Company specializing in installing the products specified in this Section with minimum three years documented experience.

F. All devices shown on drawings shall be new unless otherwise noted.

G. All of the above equipment shall be installed in the conduit systems as indicated on the plans and hereinafter specified. The manufacturer's distributor shall guarantee the entire system for one year against all defects in material and workmanship.

H. All individual panels, housings, and the entire system shall bear the label of Underwriters' Laboratories. Contractor shall provide a complete set of operating instructions including circuit diagrams and other information necessary for proper installation, operation, and service maintenance.

1.07 **SCOPE OF WORK**

A. Furnish and install all equipment, accessories, and materials in accordance with these specifications and drawings to provide a new Wireless Master Clock System.
   1. All Master clock system devices as shown on the project drawings.
   2. Master clock system shall interface, through the building's data network, to a universal time standard via Network Time Protocol (NTP). The clock shall act as a client to the local NTP time server. All building clocks shall synchronize time via the NTP time server. Connection to building's computer network shall be included. Coordinate configuration with technology department.
   3. **Entire system shall be battery backed up for a minimum of 90 minutes of operation after a power outage.**

B. Installation of the systems shall be outlined within the following specifications and on the project drawings, including but not limited to:
   1. Submission of shop drawings, catalog sheets and samples(if required) for approval.
   2. Verification of dimensions and conditions at the project site.
   3. Installation in accordance with contract documents, manufacturers' recommendations, and applicable code requirements.
   4. Initial tests and adjustments, written report, demonstration of systems for approval,participation in acceptance tests, final adjustments as required, and submission of final diagrams and owner's manuals.
   5. Instruction of operating personnel.
   6. Maintenance services for one year following acceptance of systems.
   7. All work that is to be performed under this systems contract is to be performed by factory authorized and product certified technicians.

1.08 STANDARDS

A. All of the above equipment shall be installed as indicated on the plans and hereinafter specified. The manufacturer's distributor shall guarantee the entire system for one year against all defects in material and workmanship.

B. Dealer/installer or parts and smarts provider shall be factory authorized.

C. All individual panels, housings, and the entire system shall bear the label of Underwriters' Laboratories. Contractor shall provide a complete set of operating instructions including circuit diagrams and other information necessary for proper installation, operation, and service maintenance.

D. All submitted alternate pricing will include all of the specified features and functions. If an approach other than that which is specified is included within the design, provide a line item deductive cost for each alternative approach provided.

E. Acceptable Manufacturers for this project will be:

1. Sapling

F. The above listed system suppliers representative will provide the equipment necessary to provide all system features and include a dedicated master clock panel with a rack-mounted screened instruction panel.

G. It will be the financial responsibility of the Electrical Contractor to insure that the submitted bid meets or exceeds the design criteria outlined and specified.

1.09 SUBMITTALS

A. System submittals will be provided for approval within 30 days of the contract award for approval.

B. The system submittals will include the following information presented in the following manner:

1. Section 1 of the system submittal will provide a detailed listing of each component that will be provided within the control console. A description of the components' function within the system will be included as well as a cross-reference to the component that has been specified.
2. Section 2 of the system submittal will provide a detailed listing of all intercom and clock system distribution devices and will follow the same format as outlined for Section 1.
3. (10) sets of submittals will be provided for each project school and identified as such.
4. Quantities listed on the distribution equipment submittal will be for project reference only. It will be the financial responsibility of the submitting system contractor to provide all devices shown or noted on the project drawings and as listed in the project specifications.
5. Each Section of each submittal will include data sheets for the components submitted, and presented in the order that they are listed on the section device schedule.
6. Each type of new system cable that is to be provided will also be listed in the distribution equipment schedule. System cable quantities can be listed "As Required" (A/R), but must be identified by the function it serves.

1.10 PROJECT CLOSE-OUT DOCUEMENTS

A. Project close-out documents will include:

1. As built project drawings which show system wiring, remote power supplies and all system device locations.
2. System manuals, which outline system operation, maintenance procedures and system programming, will also be provided.
3. System programming sheets and a backup programming disk will be left on site in a literature holder in the back of the control console at the school. A second set of programming sheets and backup disk will be provided to the Director of Buildings and Grounds under separate cover.
4. A one-year system warranty will be provided for all new system equipment and on the workmanship provided and performed on this project.

PART 2 - SCHOOL PUBLIC ADDRESS SYSTEM

2.01 PRODUCT OVERVIEW

A. Furnish and install all equipment, accessories, and materials in accordance with the specifications and drawings to provide a complete and operating Communication system as outlined below.

B. Following is an outline of the basic functions required, set as a minimum standard. These functions must be included in the bid. Any exceptions to these functions must be listed and submitted as part of the bid. If several manufacturers are required to provide these functions proof must be provided that they will function as one integrated system to the user.

C. Time Control and Event Scheduler
   1. 16 Schedules of Class Change Signals
   2. 32 Zones of Class Change Signals
   3. 1536 Class Change Signal Events
   4. Weekly System Event Scheduler
   5. Analog or Digital Clock Correction and synchronization
   6. Supports Electronic Message Displays for Timekeeping, Count Up-down timers and full alphanumeric messaging
   7. Automatic Daylight Savings Time Correction

2.02 WIRELESS CLOCK SYSTEM

A. MANUFACTURER
   1. Manufacturer: Sapling Inc., 670 Louis Drive, Warminster, Pennsylvania 18974, USA, Phone: 1-215-322-6063, URL: www.sapling-inc.com.

B. System requirements
   1. Ensure clock system components are designed to operate as a wireless clock system and as part of complete system including “fail-proof” design to ensure power interruption does not cause system failure.
   2. Ensure system can work in conjunction with existing wiring.
   3. Ensure system synchronizes all clocks and devices to each other.
   4. Ensure system does not require FCC licensing.
   5. Ensure system works in 915-928 MHz frequency range.
   6. Ensure system uses frequency-hopping technology.
   7. Ensure system is capable of correcting clocks immediately upon receipt of wireless signal.
      a. Analog and digital clocks automatically correct themselves on receipt of wireless signal.
      b. Include built-in closed-loop system in analog clocks capable of allowing clocks to detect position of hands and bring clocks to correct time even if clocks are manually altered.
      c. Ensure analog clocks have diagnostic function capable of allowing user to view how long since clock received wireless signal.
      d. Ensure analog clocks are capable of functional tests of electronics and gears.
   8. Ensure each individual product is bench tested at manufacturer’s facility.
      a. Random testing is unacceptable.
   9. Ensure each product is designed, assembled and tested in the United States of America.
   10. Basis of Design: Sapling Inc., Wireless Clock System.

C. Master clock
   1. Master Clock Type 1: To UL and cUL 863.
      a. Ensure master clock includes 10 pre-programmed (S)NTP backup addresses.
      b. Ensure master clock is capable of receiving (S)NTP time signal via Ethernet.
      c. Ensure master clock is capable of receiving digital signals through RS485 connection.

d. Ensure master clock is capable of correcting secondary clocks for Daylight Saving Time
e. Ensure master clock is capable of customizing Daylight Saving Time, in the event of international use or a change in government regulations.
f. Ensure master clock is capable of outputting RS485 signals.
g. Ensure master clock has two clock circuits capable of outputting signals including:
    1) 59 minute correction;
    2) 58 minute correction;
    3) National Time or Rauland correction;
    4) Once a day pulse;
    5) Rauland digital correction.
h. Communications Interface: Ensure master clock system is capable of being programmed remotely through online interface accessible through LAN and compatible with Microsoft Internet Explorer and Mozilla Firefox web browsers.
    1) Ensure interface includes functions as follows:
        (a) Allow users to schedule bells and other events;
        (b) Display features;
        (c) Show IP settings;
        (d) Show other master clock settings;
        (e) Set time and date;
        (f) Download or upload master clock settings;
        (g) Configure e-mail alerts for various instances.
i. Display: Two row, 20 character LED and backlit LED display and 2 x 8 inch rubber keypad for operator programming.
j. Optional relays: Include A/R relays to ensure master clock is capable of utilizing zones that can be used for scheduling facility systems as follows:
k. Allow for programming of master clock through 16 button rubber tactile keypad or built-in web interface.
l. Ensure master clock can contain up to 800 events.
m. Ensure master clock can contain up to 255 schedule changes.
n. Clock System: Wireless with transmitter to FCC, Part 15.
    1) Transmitter: Capable of transmitting data to SAL(G) wireless analog and SBL(G) wireless digital clocks, and receiving signal from (S)NTP time server
    2) Automatic bi-annual Daylight Savings Time changes.
o. Countdown for Digital Clocks: Ensure master clock is capable of having digital clocks counting down time between events.
p. Ensure master clock has internal battery to save settings and operate internal real-time clock for 10 years.
q. Input Voltage: 85 V AC – 264 V AC, 50/60 Hz.

2.03 MASTER CLOCK FEATURES AND PRODUCT DESCRIPTION

A. Supply and install a complete fully integrated master clock system. All of the clocks in the school shall be synchronized through the Intercom/master clock system.

B. The time control system shall be capable of operating and correcting the clocks as well as controlling class change signals to all speakers and/or bells.

C. The integrated Master Clock controller shall provide a 10-year battery back-up real time clock to ensure for correct timekeeping of the internal master clock during power failure. Once power is restored, the clock driver shall update the clocks as follows:

D. Digital clocks shall receive an instantaneously update with the correct time. The analog clocks will receive a correction of the minute hand once an hour and the hour hand once every 12 hours. An 8-second signal is required to set the minute and second hands to HH: 59:00. In addition a 14 second signal, to initiate the 12-hour correction cycle shall also be provided.

E. The system shall be capable of correcting most types of synchronous wired analog clocks. Formats shall be selectable from a list within the system by simple entry of a code.

F. The system shall be capable of correcting synchronous wireless analog clocks. These clocks shall be corrected by the internal clock of the intercom system and automatically by a web-based timekeeping service that is accessed thru the LAN or WAN

G. The system shall provide for automatic clock correction for Daylight Savings Time, Spring Ahead/Fall Back. Daylight savings shall not require the use of any user input at the time of daylight savings.

H. The master clock system shall support a minimum of 16 schedules and 1536 events as outlined in the Intercom/PA Features section.

I. The system shall support Electronic Message Displays. These displays are integral to the emergency notification needs of the facility. At least two of these displays are required for this project. Provide where indicated on the project drawings.

   1. The display shall accommodate the normal messaging provided on other Telecor digital clocks. Additionally, the display shall accommodate full alphanumeric character support along with other grammatical symbols to provide complete message display capability. Messages of up to 127 characters in length shall be supported through the use of scrolling. Scroll speed shall be user adjustable through the use of an infrared handheld remote control.
   2. The display shall provide enhanced timekeeping capabilities. The display shall provide the ability to perform count-up and countdown timing, lap timing, start, stop, reset and pause. All timing shall be displayed, in days, hours, minutes, seconds and tenths of seconds. Activation of timer functions shall be available through the use of a handheld remote or external pushbutton. There is the ability of sounding a buzzer at the EMD speaker when the timer elapses. In addition, a custom message can be displayed when the timer elapses, such “Class Change Over” or “Test Over”
   3. The display can be programmed to be part of the bell schedule of the school allowing the timer feature to be used for class change periods. The display can be used for visual confirmation of bell tone descriptions such as "End of Period 1", "Start of Period 2" or any other customized information that can be schedule set.
   4. The displays are hardware addressable and can be assigned to one of eight software "Message" Zones for the display of different messages in select areas of a facility
   5. In the event of an Emergency Call from a classroom, the origin of the Emergency Call is displayed on multiple Electronic Message Displays, giving the opportunity for school staff to respond more quickly. In addition, a console or room telephone has the ability to activate a specific message for display on a group of EMDs. This allows an emergency procedure such as school “lock down” to be activated from any telephone, quickly and efficiently.

J. The system shall provide the ability to synchronize with an existing master clock system.

K. Activation of messaging such as “BELL”, “FIRE” and other seven segment supported messaging shall be available with the implementation of Telecor digital clocks. Activation shall be accomplished by external devices, dial-up through a telephone or control console or based on a time event.

L. Alphanumeric coded messages shall also be available for security and discrete messaging purposes. Messages shall provide “E**E” where the “*” shall represent a number.

M. The Secondary Clock shall be a Wireless unit Telecor model as indicated on the drawings. It shall be able to both receive and re-transmit a correction signal. The time base shall be provided by a master clock or microprocessor-based administrative communication system and shall be transmitted by a wireless transceiver (model 2490). The clock shall be capable of receiving a wireless signal from other wireless clocks on the system. Each clock shall receive and transmit with 915-928 MHz frequency-hopping technology. The clock shall be capable of transmitting the signal simultaneously with other wireless clocks without interference. The clock shall immediately self-correct upon receipt of the wireless signal. The clock shall have a maximum correction time of five minutes. The clock shall include automatic calibration as well as diagnostic functionality that allows the user to check the quality of the signal, when the clock last received a signal, and to perform a comprehensive analysis of the clock itself. The clock case shall be constructed of black ABS plastic and shall have a smooth surface. The clock shall have black hour and minute hands as well as a red second hand. The dials shall have 12-hour Arabic numerals in Helvetica.

N. The Wireless Analog Clock shall be round and have a 12” diameter display, employing a low-profile, semi-flush metal case suitable for wall mounting. It shall require a standard 1-gang electrical box for installation. Model shall be 2491.

O. The Wireless Analog Clock shall be a round, double-face unit, having a pair of 12” diameter displays. The clock shall be suitable for surface mounting from either the wall or ceiling. It shall require a standard 2-gang electrical box for installation. Model shall be 2492.

P. The Wireless Analog Clock shall be round and have a 16” diameter display, employing a low-profile, semi-flush metal case suitable for wall mounting. It shall require a standard 1-gang electrical box for installation. Install with wireguard where indicated. Model shall be 2493

Q. The Wireless Analog Clock shall be battery powered from 2 "D" batteries. The approximate life of the batteries shall be 5 years.

2.04 EQUIPMENT RACKING

A. The central electronics equipment shall be contained in an upright rack, Telecor model 242, 261 or 277 or approved equal. The rack must be sized by the contractor to house all components required by this specification plus 20% spare for additions.

B. The rack shall be 21.9" wide and 18.5" deep. It shall be constructed of CRS, using 16 gauge material for the top and bottom of the rack and 14 gauge material for the sides. The rack shall be equipped with both front & rear mounting rails, punched on standard EIA centers. The rack shall be complete with a hinged, locking rear door. The rack shall be finished in Black Baked Enamel.

C. The rack must be supplied with locking castors to enable movement if necessary.

PART 3 - EXECUTION

3.01 SYSTEM INSTALLATION

A. All items of equipment shall be installed in accordance with manufacturer recommendations to operate as complete individual systems.

B. Provide all necessary wiring, hardware, etc. for complete systems installation.

C. Provide all necessary wiring dress as required and/or noted on drawings. All wiring shall be run in conduit or in cable trays, unless noted.

D. Back boxes of proper size and configuration shall be provided for all components requiring them.

E. Install conduit sub and wiring to each device as required

F. Provide 120V circuits to devices as required

G. Termination's

1. Splice, taps, and Terminations's: Use numbered terminal strips in junction, pull and outlet boxes, terminal cabinets, and equipment enclosures. Tighten connections to comply with tightening torque's specified in UL Standard 486A

H. The manufacturer's authorized representatives shall perform a quality inspection of the final installation and, in the presence of the Electrical Contractor and Owner's Representatives, shall perform a complete functional test of the systems. A System Certification verifying the proper system operation shall be required prior to acceptance.

I. The installing contractor (including system head end, devices, and wiring) will be an authorized distributor or an authorized agent of the system distributor and have a minimum of five (5) similar systems currently in operation. These installations and contact names must be included in any alternate bid.

J. System wiring shall be in accordance with good engineering practices as established by the EIA and NEC. Wiring shall meet all established state and local electrical codes. All wiring shall test free from grounds and shorts.

K. Contractor shall provide necessary transient protection on the AC power fee, all station lines leaving or entering the building, and all Central Office trunks. All protection shall be as recommended by the equipment supplier and referenced to earth ground.

L. Contractor shall furnish a minimum of eight (8) hours of in-service training on each system. These sessions shall be broken into segments that will facilitate the training of individuals in operating station equipment, administrative devices, user programming functions, diagnostics and program distribution equipment. Operating manuals and users' guides shall be provided at the time of the training.

M. Cable Routing

1. All cabling to re routed within approved raceway or above lay-in ceiling. Cabling shall be hidden by ceiling or raceway in all locations of the building with the exception of IDF and MDF rooms or as otherwise noted on the drawings.
    a. Where cable tray is provided, route cabling within cable tray.
    b. Where conduit sleeve is provided, route cabling within conduit sleeve
    c. Above lay-in ceilings, where cable tray or conduit sleeves are not available:
        1) Where raceway for cabling is not provided, Contractor shall run cabling through 2" J hooks.
            (a) J hooks shall be directly attached to building structure at a maximum of 4'-0" center-to-center.
            (b) Additional J hooks will be added as necessary to limit the maximum cable catenary (cable sag) to 12" maximum.
            (c) Install tye-wraps around all J hooks upon completion of cable pulls.
            (d) J hook cable density shall not exceed 60% of the maximum cable count suggested by manufacture. If necessary, provide additional level of J hooks for high cable density runs.

(e) Contractor shall provide all mounting hardware (threaded rod, unistrut, etc.) Necessary to solidly mounted, complete cable raceway system.

3.02 FIELD QUALITY CONTROL

A. Perform field inspection and operation tests on completed installation to verify proper operation.
B. Replace equipment, components, and wiring to eliminate audible noise, clicks, pops, or hum when system is in standby or operation.

3.03 ADJUSTING AND LABELING

A. Adjust controls and configuration for operation as indicated.
B. Adjust system to achieve proper operations.
C. Set status of each classroom call-in cevice and other stations as directed
D. All wiring shall be clearly labeled at the new system head end

3.04 FINAL DEMONSTRATION AND CERTIFICATION OF COMPLETION

A. Demonstrate that the system meets the Specifications and complies with applicable standards. This final test shall be witnessed by a representative of the Owner and a factory authorized service representative.
B. Upon completion of the installation, (4) copies of complete operational instructions shall be furnished, complete with record drawings. Instructions shall include part numbers and names, addresses, and telephone numbers of parts source. Final payment shall not be made until operational manuals have been received.
C. Check-out and final connections to the systems shall be made by a factory trained techniciian in the employ of a manufacturer of the products installed. In addition, factory trained technicians shall demonstrate operation of the complete system and each major components to the Owner.
D. Upon completion of the installation of the equipment, the Contractor shall provide to the Engineer a signed statement from the equipment supplier that the system has been wired, tested, and functions properly according to the specifications.

3.05 **GUARANTEE**

A. The Contractor shall guarantee all wiring and terminal equipment to be free from inherent and mechanical defects due to workmanship and materials used for a period of (1) year from the date of final acceptqance from the Owner.
B. The Intercom System Manufacturer, not the distributor or Contractor, shall furnish or Contractor, shall furnish in writing a (1) one year warranty. Warranty shall list all equipment in the system and state the equipment to be free from inherent and mechanical defects due to workmanship and materials for a period of (1) year from the date of final acceptance from the owner.
C. Warranty service for the equipment shall be provided by the system supplier's factory trained repressentative.
D. The guarantee will cover the entire system (electronic components, wiring, software, peripheral devices, etc.). The guaraantee will be structured such that any system malfunction during the first year from system final acceptance will be completely repaired, during normal working hours, at no additional cost to the owner.

3.06 TRAINING

A. Provide all training and utilize specified manuals and record documentation. All training shall be provided at the project site and cordinate with the Owner.
B. Provide system demonstration and instructions. Allow a minimum of 16 hours to be broken into segments which will facilitate the training of individuals in the operation of the system. At a minimum, these segments shall consist of the following periods: at final completion of the installation, six weeks after final completion, during the last month of the warranty period. The length and number for each training segment will be determined by the Owner. The minimum length will be two hours.
C. Operators Manuals and User Guides shall be provided at the time of the first training segment.
D. Demonstrate adjustment, operation and maintenance of the system including each component and contro.

END OF SECTION

SECTION 281300 - EXTENSION/MODIFICATION OF EXISTING ACCESS CONTROL SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

A. The work includes furnishing all labor, materials, tools, equipment, and documentation required for a complete and working Security Management Information System [SMIS] as specified in this document.

1.02 RELATED SECTIONS

A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables (600 V and Less).
B. Section 260526 - Grounding and Bonding for Electrical Systems: Electrical system grounding and bonding.
C. Section 260534 - Conduit.
D. Section 260535 - Surface Raceways
E. Section 260537 - Boxes.

1.03 REFERENCES

A. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
B. IAC 180 - Illinois Administrative Code 180.
C. UL 294, UL864 and UL 1076
D. FCC Rules and Regulations
E. Part 15, Radio Frequency Devices
F. National Electrical Manufacturers Association (NEMA)
G. Section 250 Enclosures for Electrical Equipment

1.04 COORDINATION OF WORK

A. Contractor shall furnish and install all conduit/raceway as required for the access control system. This includes all raceway explicitly shown on plans or generically required for a complete, functional system.
B. Contractor shall furnish and install all specialty backboxes for devices as required for the access control system. This includes all backboxes explicitly shown on plans or generically required for a complete, functional system.
C. Contractor shall furnish and install all branch circuits required for the access control system as specified. This includes all circuits explicitly shown on plans or generically required for a complete, functional system.

1.05 SPECIFIED SYSTEM

1.06 SCOPE OF SYSTEM

A. Provide and install a complete access control system.

1.07 QUALITY ASSURANCE

A. The system programmer shall have attended manufacturer training and obtained certification in Genetec™ Security Center - Synergis™ Technical Certification.
B. Optionally, the system programmer shall have attended manufacturer training and obtained certification in Genetec Security Center - Enterprise Technical Certification.
C. New camera system software and function shall integrate with existing Genetec access control system software and function. All programing to provide a single unified software platform shall be occomplished as part of this project.
D. Additional Installer qualifications: the work of this section shall be performed by a qualified card access system contractor under the direct supervision of the Electrical Subcontractor. Minimum requirements for the card access are
    1. The installation contractor must be an Axis partner. With at least 1 Axis certified professional on staff. The successful bidder must have been an Axis partner for at least twelve months.
    2. Carries replacement parts in stock and have personnel trained in service and trouble shooting of the products specified.
    3. Experienced in installing and servicing low voltage, micro processor based systems.
    4. Installation shall be performed under the supervision of a technician trained and approved by the manufacturer of the security control panel system. Technician shall make final adjustments, check operation of the systems, certify that the final installation is in accordance with the manufacturer, and instruct the Owner on the programming, use, and operation of the systems.
    5. The video surveillance systrem contractor shall have a minimum of three (3) service personnel on call at the same time and provide service response within 24 hours.
    6. Licensed by the State of Illinois as a Private Alarm Contractor under the Private Detective, Private Alarm and Private Security Act of 1993.
E. Products: Furnish products listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and indicated.
F. Delivery, Storage and Handling
    1. Packing and shipping:
        a. Deliver items in manufacturer's original packaging.
        b. Package with bolts, screws, and fastenings for installation.
        c. Pack keys separately. Identify with Owner's name, factory order number, and contract number.
    2. Acceptance at site:
        a. Store materials above grade in a dry, well ventilated area.
G. Job Conditions
    1. Do not install electronic components until major construction work in the area is complete. Do not install in areas where dust or moisture can contaminate the working parts or where finish can be marred by construction work.

1.08 SUBMITTALS

A. Contractor shall submit all items in accordance with the requirements of Division 1, Submittals and shall include, but not be limited to the following:
    1. Model numbers of all components furnished on the job
    2. Manufacturer's catalog data sheets for all components

3. Input power requirements for all components
4. Complete engineered drawings indicating:
    a. Manufacturer model numbers and specifications
    b. Dimensions, layouts, installation details
    c. Point-to-point wiring diagrams for all devices
    d. Termination details for all devices
    e. Single-line system architecture drawings representing the entire system
5. Owner acceptance form with a check box associated with each card reader and input point to indicate that each point was checked off as properly installed and reporting back to the control panel and the host computer prior to Owner acceptance of the system.
6. 3 sets of the Manufacturer's User's Manuals and Installation Manuals.
7. Course outlines for each of the end user training programs. The course outlines shall include the course duration, location, pre-requisites, and a brief description of the subject matter.

1.09 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.
B. Conform to Illinois Administrative Code 180 and all building codes as listed in IAC section 180.60.
C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.
D. Installer Qualifications: Company specializing in performing the work of this section with minimum five years of documented experience.

1.10 PRE-INSTALLATION MEETING

A. Convene one week before starting work of this section.

1.11 WARRANTY

A. The system shall be warranted for a period of 1 year from date of acceptance or first beneficial use, whichever occurs first. Written notification shall be sent to the Owner stating the date this warranty period has started.
B. The equipment manufacturer shall make available to the Owner a maintenance contract proposal to provide a minimum of two inspections and preventative tests per year.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Genetec

2.02 PRODUCT DESCRIPTION

A. The access controller shall be a single door control, 'smart' to the entry with expansion ability to add a second ‘smart” door via a plug-in option board. The controller will operate in a 'stand-alone' mode or within a network of other like controllers. All decisions regarding the user access, alarms, and automatic timed functions are made at the controller, independent of a computer.
    1. The controller shall contain and operate various outputs for controlling access:

a. A 1.0 amp, (24VDC max.) dry circuit, single pole, double throw relay for application of power to an electric locking device, automatic gate, or door operator.
b. An alarm output consisting of a 1.0 amp, Form C, dry circuit closure.
c. The alarm output must be configurable to annunciate the following conditions either via the same relay or separately via an auxiliary relay located on the option board:
    1) Door forced condition.
    2) Door held open condition.
    3) Both conditions.
    4) Neither condition.
d. An RS485 network communications output capable of linking up to 128 controllers (256 doors) into one network.
    1) The connectors shall be quick disconnect connectors for easy service.
        (a) The RS-485 shall be configured to automatically detect an open, shorted or crossed line condition.
e. A standard RS232 serial output will provided that can be configured for direct connection, modem or Ethernet connection to a personal computer.
    1) The connector shall be a quick disconnect connector.
        (a) The RS232 port shall be directly adaptable to an on board Ethernet connection.
        (b) The controller shall offer the option for an additional RS-232 output for integration with an alarm panel.

2. The controller/option board shall contain various inputs and outputs for managing a door, gate or similar entry/exit point::
    a. A door status input for sensing a normally closed switch.
    b. TWO user configurable request to exit inputs
    c. A general, normally open input that can provide a global release of all lock relays in the network.
    d. A special purpose, multi-pin connector for adding an auxiliary board for increasing the functionality of the main controller.
    e. Two reader inputs, which can be ordered in either Wiegand-compatible format or Keri high security MS Series proximity format.
3. The controller shall contain special visual aids for viewing diagnostic tests and ID functions.
    a. An LCD display to be used as a programming and diagnostic aid.
    b. A segmented LED display to be used as a controller address display and volt meter
    c. LED status indicators that display improper controller voltage conditions, crossed-wired power connection (positive and negative input wiring reversed), as well as over-current draw conditions
    d. A single push-button switch for setting the controller address, and for selecting and performing diagnostic tests.
    e. LED indicators to confirm that the option board is properly seated and configured.
    f. Visual LED indicators for lock and alarm relay position status.
4. The controller's database memory shall be nonvolatile (supported by a lithium battery) with an expected life of five years.

a. The database shall maintain a memory capacity to manage up to 65,000 card/tag holders per controller.
    1) Cards can be enrolled into the system using a block enrollment method by card number sequence.
    2) Card and tag enrollment can also be accomplished by a “learn” method, where individual cards/tags can be presented to an enrollment reader.
b. The database shall maintain a memory capacity capable of storing at least 3,600 transactions.
    1) When the transaction memory becomes full, old transactions will be deleted on a first in, first out basis to make room for new transactions.
    2) The controller's transaction memory shall have the ability to record of all transactions performed by the controller, but alternately programmable to record only those transactions required by the operator.
    3) The transaction memory shall operate independent of other controllers within the network of controllers.
c. The Master controller (address #1) shall be capable of communicating with a personal computer at a remote location via a direct connection, Ethernet, or a telephone modem. All secondary or slave controllers will communicate via high security 9 bit RS-485 protocols
    1) The controller shall automatically sense if connected directly to a PC or if connected via modem and adjust its communication protocols accordingly.
    2) If the controller is using a modem, the modem shall communicate at 9600 baud or faster.
    3) The controller shall contact the host and upload the contents of the controller’s buffer when the buffer reaches an operator-definable pre-programmed percentage of its event database memory capacity. Should the communication connection be broken during the upload process, the controller shall try to re-establish the communication connection every 15 minutes until a successful connection is made and all data is uploaded.

5. The controller shall provide two reader inputs. These inputs can either both be proximity or both be Wiegand interface inputs:
    a. Two readers can be operated simultaneously.
    b. The readers can be configured to indicate direction – ingress and egress, or
    c. The second reader can be used to operate a second door with fully independent controls.
6. The controller shall be programmed using a personal computer with the following requirements:
    a. The personal computer must use the Windows 95, Windows 98, Windows ME, XP, or Windows NT v4.0 operating system.
    b. The personal computer must use a 90 MHz, Pentium microprocessor (or faster).
    c. The personal computer must have 40 Mbytes of available hard disk space.
    d. The personal computer must have a minimum of 16 Mbytes of RAM.
    e. The personal computer must have an available COM port equipped with a 16550 UART.
    f. The personal computer must have a mouse or some similar pointing device.

g. The personal computer must have a CD-ROM drive.
h. SVGA color monitor with SVGA graphics card (800 x 600 minimum resolution.

7. The maximum dimensions for the controller within the enclosure shall be
8. 9.25 inches high by 8.2 inches wide by 2.6 inches deep (24.65 cm H x 20.25 cm W x 6.60 cm D), with “knock-outs” to accept both USA and metric conduit.. The enclosure shall be metal and with equipped with a locking mechanism.
9. All cable/wiring connections shall be of quick disconnect type.
10. The controller shall operate using 12 volts DC with a current consumption of no more than 670 mA in an alarm state with all options installed.
11. The controller shall have MOVs across all relay outputs and transorbs across all inputs and non-relay outputs to provide electrical surge/transient protection.
12. The controller shall provide protection against incorrect input power connections (i.e. reversed power and ground, voltage too high or too low).
13. The operating temperature range of the controller shall be no less than 0º F to 140º F (-18º C to 60º C) at 0% to 90% Relative Humidity, noncondensing.

B. All configuration, programming, and monitoring of the controllers must be done through a software program that makes these tasks easy to perform and is supported by an optional two hour on-line training course.

1. The software program must have the ability to seamlessly integrate and manage access control, telephone entry, and alarm system control functions, and contain the following features:
   a. An unlimited.
   b. Have the ability to manage up to 32 distinct time zones with each time zone subdivided into the 7 days of the week, 3 holiday schedules, and 4 start/stop time intervals.
   c. Have the ability to configure up to 1024 input monitoring points (8 per individual controllers with option board installed) and 512 Form C, output relay points (4 per individual controller with option board installed) with the following features:
      1) All relay points must be programmable to either follow the state of an associated input point or be latched to a state based on an input point.
      2) The operation of all Form C, output relay points must be assignable to time zones, such that the output relay points can have time periods when they are active/operational, and time periods when they are inactive/idle.
      3) All input monitoring points must be linkable to output relay points, allowing input events to initiate output relay responses.
      4) For each controller, all input monitoring points and output relay points on that controller must be able to be used in multiple links on that controller, allowing any combination of controller inputs to drive any combination of controller outputs.
   d. An unlimited number of access groups (combinations of access/egress points and time zones) shall be available for creation and assignment of cardholders access privileges.
   e. The software shall contain a utility to automatically store archived event data in weekly, monthly or yearly files.

f. Have the ability to configure up to three, separately configurable, event monitoring windows, with each window capable of displaying operator-selectable event information.
g. Have the ability to automatically unlock and relock specific doors at specified times of the day and day of the week, with user defined overrides on user defined dates.
h. Have the ability to implement a “First Person In” feature such that an auto-unlock schedule is not activated until an authorized person has entered the premises. This feature should allow early entrance in fifteen minute increments up to one hour in advance of the specified unlock time.
i. Have the ability to disable the reporting of specified events that do not need to be tracked, to save event storage space on the controller.
j. Have the ability to poll the access control network and retrieve network hardware status information that the program uses to automatically setup and configure itself without manual data entry.
k. Allow the assignment of future activation and expiration dates and times to individual cardholders, which are stored at the controller level.
l. Provide event records including alarm panel operation when the controller is integrated with an alarm panel.
m. Provides event records including telephone access activity when the controller is integrated with a telephone access panel.

C. The access control network of controllers must be able to expand to meet future requirements as follows.
1. An access control network must be able to expand to up to 256 doors in 1-door increments.
2. The access control software and host PC must be able to communicate with up to 255 remote access control networks via modem or TCP/IP connection, each with up to 256 doors

D. The primary type of reader shall be a high security proximity type of reader. The proximity reader shall be connected directly to the main controller without the need for an option card and it shall not require a special interface for data formatting. The proximity reader shall read a unique identification number from each card or tag when the card or tag is presented to the surface of the reader, without a need for the card or tag to touch the reader.
1. The controller will support a variety of reader styles:
a. A door frame reader (mullion reader) that can be mounted directly on a standard metal mullion doorframe (1.75 inches or 4.5 cm).
1) The read range using a standard proximity card shall be up to 4 inches (10 cm).
2) The dimensions of the reader shall be 3.25 inches high by 1.40 inches wide by 0.375 inches deep (8.2 cm H x 3.5 cm W x 0.96 cm D).
3) The reader shall be of a weatherproof, potted, rugged design.
4) The reader shall provide a multi-color LED and a sound alert for status annunciation.
b. A single gang mount, wall switch reader that can be mounted onto a metal or plastic USA electrical junction box or on a non-metallic flat surface.
1) The read range using a standard proximity card shall be up to 6.00 inches (15 cm).

2) The dimensions of the reader shall be 4.40 inches high by 3.00 inches wide by 0.375 inches deep (11.13 cm H x 7.62 cm W x 0.96 cm D).
3) The reader shall be of a weatherproof, potted, rugged design.
4) The reader shall provide a multi-color LED and a sound alert for status annunciation.

c. A medium range reader that can be mounted to most building materials except metal.
1) The read range using a standard proximity card shall be up to 14 inches (35cm).
2) The dimensions of the reader shall be 8.50 inches high by 6.00 inches wide by 0.75 inches deep (21.59 cm H x 15.24 cm W x 1.91 cm D).
3) The reader shall be of a weatherproof, potted, rugged design.
4) The reader shall provide a multi-color LED and a sound alert for status annunciation.

d. A high-security, vandal resistant reader constructed of bullet and heat resistant material that is capable of withstanding severe shock. It can be mounted to most building materials including metal.
1) The read range using a standard proximity card shall be up to 1.0 inches (2.54 cm).
2) The dimensions of the reader shall be 5.25 inches high by 2.00 inches wide by 0.75 inches deep (13.35 cm H x 5.08 cm W x 1.91 cm D).
3) The reader shall be of a weatherproof, rugged design.

2. The operating temperature of all readers shall be at least -22º F to 150º F
3. (-30ºC to 65ºC).
4. Accidental or intentional transmission of radio frequency signals into the reader shall not compromise the security of the access control system.
5. The electrical connection between the reader and the controller shall be a color-coded, six conductor, #24 AWG or greater gauge, shielded cable. No coaxial cable or special connectors shall be required.

E. Cards and tags shall be uniquely encoded and not sensitive to facility code matching or other limiting factors.
1. Presentation of a card or tag to a reader will produce an audible 'beep' from the reader and will change the color of the reader LED.
a. The audio beep shall be a single beep for access denied and a double beep for access granted.
b. An Amber LED shall indicate power is on.
c. A Green LED shall indicate access is granted.
d. A Red LED shall indicate access is denied.
2. Several card/tag options shall be available, including a standard “clamshell” proximity card in the shape of a credit card and shall fit comfortably in a wallet, pocket, or purse.
a. The dimensions shall be 3.38 inches long by 2.13 inches wide by 0.065 inches thick (8.6 cm H x 5.4 cm W x 178 mm D).
b. The color shall be white with the encoded number and a date code printed on its surface.
3. A standard proximity key tag shall be in the shape of a teardrop. It will have an eyelet, allowing the tag to be attached to a key ring.

a. The dimensions shall be 1.57 inches long by 0.98 inches wide (at its widest area) by 0.157 inches thick (40 mm H x 25 mm W x 4 mm D).
b. The color shall be light gray with the encoded number and a date code printed on its surface.

4. A photo imageable "ISO" proximity card capable of accepting a direct print of photo and other graphics from a dye-sublimation printer.
a. 1. The dimension shall be 3.38" x 2.13" wide x 0.031" thick (86 mm x 54 mm x 0.08mm).
b. 2. The color shall be white with the encoded number and a date code printed on its surface.
c. 3. The card shall be optionally available with a standard high coercivity three track magnetic stripe.

F. The controller shall optionally be able to accept readers using a standard Wiegand interface in place of the high security MS Series proximity reader.
1. The controller will support a variety of Wiegand interface types:
a. Magnetic Stripe
b. Wiegand Swipe or Insert
c. Bar Code
d. Keypad
e. Biometric (such as hand-geometry, fingerprint, or retinal recognition)
f. Electrical Discharge or Touch Devices
2. Wiegand interface reader devices must output data per the Security Industry Association's (SIA) Wiegand Reader Interface Standard (SIA document number AC-01D-96).

G. The product warranty to the user warrants the equipment to be free from defects in material and workmanship for the following time period from the date of purchase.
1. A two-year unconditional warranty for the controller electronics.
2. A lifetime warranty for the doorframe and single gang mount readers.
3. A lifetime warranty for the medium and extended range proximity readers.
4. A lifetime warranty for the high security, vandal resistant proximity reader.
5. A lifetime warranty for standard proximity cards and key tags.
6. A one-year warranty for the ISO card.

PART 3 EXECUTION

3.01 INSTALLATION REQUIREMENTS

A. Install system per the manufacturer's instructions.
B. Coordinate the operational compatibility of all locking devices not supplied by the Access Control manufacturer with the Access Control manufacturer.
C. If required by the Access Control manufacturer, the locking devices supplier shall include electronic suppression and be rated for continuous duty operation.
D. All locking device wiring shall be run separate from all other system wiring except wire specifically permitted by the Access Control supplier.

3.02 PATHWAYS

A. Install with the following minimum clearances:

1. 48 inches from motors, generators, frequency converters, transformers, x-ray equipment, and uninterruptible power systems.
2. 12 inches from power conduits and cables and panelboards.
3. 5 inches from fluorescent and high frequency lighting fixtures.
4. 6 inches from flues, hot water pipes, and steam pipes.

B. Conduit:
1. Do not install more than 2 (two) 90 degree bends in a single horizontal cable run.
2. Leave pull cords in place where cables are not initially installed.
3. Conceal conduit under floor slabs and within finished walls, ceilings, and floors except where specifically indicated to be exposed.
   a. Conduit may remain exposed to view in mechanical rooms, electrical rooms, and telecommunications rooms.
   b. Treat conduit in crawl spaces and under floor slabs as if exposed to view.
   c. Where exposed to view, install parallel with or at right angles to ceilings, walls, and structural members.
   d. Under floor slabs, locate conduit at 12 inches, minimum, below vapor retarder; seal penetrations of vapor retarder around conduit.

C. Grounding and Bonding: Perform in accordance with TIA J-STD-607 and NFPA 70.

D. Firestopping: Seal openings around pathway penetrations through fire-rated walls, partitions, floors, and ceilings.

E. Cable Routing
1. All cabling to re routed within approved raceway or above lay-in ceiling. Cabling shall be hidden by ceiling or raceway in all locations of the building with the exception of IDF and MDF rooms or as otherwise noted on the drawings.
   a. Where cable tray is provided, route cabling within cable tray.
   b. Where conduit sleeve is provided, route cabling within conduit sleeve
   c. Above lay-in ceilings, where cable tray or conduit sleeves are not available:
      1) Where raceway for cabling is not provided, Contractor shall run cabling through Erico Cablecat 2" J hooks.
         (a) J hooks shall be directly attached to building structure at a maximum of 4'-0" center-to-center.
         (b) Additional J hooks will be added as necessary to limit the maximum cable catenary (cable sag) to 12" maximum.
         (c) Install tye-wraps around all J hooks upon completion of cable pulls.
         (d) J hook cable density shall not exceed 60% of the maximum cable count suggested by manufacture. If necessary, provide additional level of J hooks for high cable density runs.
         (e) Contractor shall provide all mounting hardware (threaded rod, unistrut, etc.) Necessary to solidly mounted, complete cable raceway system.

3.03 TESTING AND COMMISSIONING

A. The SMIS supplier shall be responsible for final system hardware hook-up and checkout prior to commissioning the system to the end-user.

3.04 TRAINING AND INSTRUCTION

A. Before the system is turned over to the Owner, the manufacturer shall provide 4 days of system operations training at the project site using the customers equipment for up to 10 of the Owners representatives meeting a minimum expected level of computer competence.
B. This training shall be conducted during normal business hours of the equipment supplier at a date and time of mutual convenience.
C. This training shall be conducted by a dedicated trainer employed full-time for the purpose by the manufacturer of the access control system. Representatives of a local dealer operation shall not be considered acceptable.

3.05 SOFTWARE SUPPORT

A. The SMIS shall be supported by the manufacturer for no less than one year from date of system turnover.

END OF SECTION

SECTION 281310 - LOCAL INTERCOM/VIDEO AND DOOR ACCESS CONTROL SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

A. The work includes furnishing all labor, materials, tools, equipment, and documentation required for a complete and working Intercom and Door Access Control System as specified in this document.

1.02 RELATED SECTIONS

A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables (600 V and Less).
B. Section 260526 - Grounding and Bonding for Electrical Systems: Electrical system grounding and bonding.
C. Section 260534 - Conduit.
D. Section 260535 - Surface Raceways
E. Section 260537 - Boxes.

1.03 REFERENCES

A. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
B. IAC 180 - Illinois Administrative Code 180.
C. UL 294, UL864 and UL 1076
D. FCC Rules and Regulations
E. Part 15, Radio Frequency Devices
F. National Electrical Manufacturers Association (NEMA)
G. Section 250 Enclosures for Electrical Equipment
H. Applicable Federal, State, and Local laws, regulations, and codes.

1.04 COORDINATION OF WORK

A. Contractor shall furnish and install all conduit/raceway as required for the local intercom and access control system. This includes all raceway explicitly shown on plans or generically required for a complete, functional system.
B. Contractor shall furnish and install all specialty backboxes for devices as required for the local intercom and access control system. This includes all backboxes explicitly shown on plans or generically required for a complete, functional system.
C. Contractor shall furnish and install all branch circuits required for the local intercom and access control system as specified. This includes all circuits explicitly shown on plans or generically required for a complete, functional system.

1.05 SPECIFIED SYSTEM

A. The equipment supplied shall be a standard labeled product of the equipment manufacturer, bearing the companies name and having their exclusive model numbers. This company must be of established reputation and experience, regularly engaged in the manufacture, supply and support of such systems for a period of at least five consecutive years under the current company name. This company shall have a fully staffed office of sales and technical support representatives within a [one day] travel time to the project.

B. The company selected shall be a direct manufacturer of the said product and shall utilize the same name in support and service of the product.

1.06 SCOPE OF SYSTEM

A. The system shall be a complete Intercom and Door Access Control system with functions as described on drawing.

1.07 ABBREVIATIONS

A. The following abbreviations are used in this document:
B. ABA American Banking Association
C. ANSI American National Standards Institute
D. ASCII American Standard Code for Information Interchange
E. AWG American Wire Gauge
F. bps Bits Per Second
G. CCTV Closed Circuit Television
H. CPU Central Processing Unit
I. FCC Federal Communications Commission
J. ID Identification
K. IEEE Institute of Electrical and Electronics Engineers
L. I/O input / output
M. NEC National Electrical Code
N. NEMA National Electrical Manufacturers Association
O. PIN Personal Identification Number
P. SMIS Simplex Security Management Information System
Q. TSP Twisted Shielded Pair
R. UL Underwriters Laboratories, Inc.

1.08 SUBMITTALS

A. Contractor shall submit all items in accordance with the requirements of Division 1, Submittals and shall include, but not be limited to the following:
    1. Model numbers of all components furnished on the job
    2. Manufacturer's catalog data sheets for all components
    3. Input power requirements for all components
    4. Complete engineered drawings indicating:
        a. Manufacturer model numbers and specifications
        b. Dimensions, layouts, installation details
        c. Point-to-point wiring diagrams for all devices
        d. Termination details for all devices
        e. Single-line system architecture drawings representing the entire system
    5. Owner acceptance form with a check box associated with each card reader and input point to indicate that each point was checked off as properly installed and reporting back to the control panel and the host computer prior to Owner acceptance of the system.
    6. 3 sets of the Manufacturer's User's Manuals and Installation Manuals.

7. Course outlines for each of the end user training programs. The course outlines shall include the course duration, location, pre-requisites, and a brief description of the subject matter.

1.09 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.
B. Conform to Illinois Administrative Code 180 and all building codes as listed in IAC section 180.60.
C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years documented experience and with service facilities within 100 miles of Project.
D. Installer qualifications: the work of this section shall be performed by a qualified Intrusion Detection System Subcontractor (IDSS) under the direct supervision of the Electrical Subcontractor. Minimum requirements for the IDSS are
   1. Factory trained and authorized installer of the products specified.
   2. Carries replacement parts in stock and have personnel trained in service and trouble shooting of the products specified.
   3. Experienced in installing and servicing low voltage, micro processor based systems.
   4. Installation shall be performed under the supervision of a technician trained and approved by the manufacturer of the security control panel system. Technician shall make final adjustments, check operation of the systems, certify that the final installation is in accordance with the manufacturer, and instruct the Owner on the programming, use, and operation of the systems.
   5. The IDSS shall have a minimum of three (3) service personnel on call at the same time and provide service response within 24 hours.
   6. Licensed by the State of Illinois as a Private Alarm Contractor under the Private Detective, Private Alarm and Private Security Act of 1993.
E. Products: Furnish products listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and indicated.

1.10 PRE-INSTALLATION MEETING:

A. Arrange and atttend a pre-installation meeting with the owner/architect/engineer to review system partitions, functionality and device location. Devices shall be relocated per request by design team; therefore, meeting must occur before raceway rough in. No additional compensation shall be allowed for device re-location.
B. Arrange for a meeting of trades involved in the installation. Coordinate the work to assure a complete operational system.
C. Arrange a training session for trades involved in the installation.

1.11 WARRANTY

A. The system shall be warranted for a period of 1 year from date of acceptance or first beneficial use, whichever occurs first. Written notification shall be sent to the Owner stating the date this warranty period has started.
B. The equipment manufacturer shall make available to the Owner a maintenance contract proposal to provide a minimum of two inspections and preventative tests per year.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Aiphone

2.02 SYSTEM COMPONENTS

A. Intercom System Description
   1. See Drawings

PART 3 EXECUTION

3.01 INSTALLATION REQUIREMENTS

A. Install system per the manufacturer's instructions.
B. Coordinate the operational compatibility of all locking devices not supplied by the Access Control manufacturer with the Access Control manufacturer.
C. If required by the Access Control manufacturer, the locking devices supplier shall include electronic suppression and be rated for continuous duty operation.
D. All locking device wiring shall be run separate from all other system wiring except wire specifically permitted by the Access Control supplier.

3.02 CABLE ROUTING

A. All cabling to re routed within approved raceway or above lay-in ceiling. Cabling shall be hidden by ceiling or raceway in all locations of the building with the exception of IDF and MDF rooms or as otherwise noted on the drawings.
   1. Where cable tray is provided, route cabling within cable tray.
   2. Where conduit sleeve is provided, route cabling within conduit sleeve
   3. Above lay-in ceilings, where cable tray or conduit sleeves are not available:
      a. Where raceway for cabling is not provided, Contractor shall run cabling through Erico Cablecat 2" J hooks.
         1) J hooks shall be directly attached to building structure at a maximum of 4'-0" center-to-center.
         2) Additional J hooks will be added as necessary to limit the maximum cable catenary (cable sag) to 12" maximum.
         3) Install tye-wraps around all J hooks upon completion of cable pulls.
         4) J hook cable density shall not exceed 60% of the maximum cable count suggested by manufacture. If necessary, provide additional level of J hooks for high cable density runs.
         5) Contractor shall provide all mounting hardware (threaded rod, unistrut, etc.) Necessary to solidly mounted, complete cable raceway system.

3.03 TESTING AND COMMISSIONING

A. The SMIS supplier shall be responsible for final system hardware hook-up and checkout prior to commissioning the system to the end-user.

3.04 TRAINING AND INSTRUCTION

A. Before the system is turned over to the Owner, the manufacturer shall provide 4 days of system operations training at the project site using the customers equipment for up to 10 of the Owners representatives meeting a minimum expected level of computer competence.
B. This training shall be conducted during normal business hours of the equipment supplier at a date and time of mutual convenience.
C. This training shall be conducted by a dedicated trainer employed full-time for the purpose by the manufacturer of the access control system. Representatives of a local dealer operation shall not be considered acceptable.

3.05 SOFTWARE SUPPORT

A. The SMIS shall be supported by the manufacturer for no less than one year from date of system turnover.

END OF SECTION

SECTION 282300 - NEW VIDEO SURVEILLANCE SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The work includes furnishing all labor, materials, tools, equipment, and documentation required for a complete and working access conbtrol and video surveillance systems as specified in this document and as indicated on the drawings.
B. Video Managemet System
    1. Hardware
    2. Software
C. Cameras
D. Network Switches

1.02 RELATED SECTIONS

A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables (600 V and Less).
B. Section 26 0534 - Conduit.
C. Section 26 0537 - Boxes.
D. Section 271005 - Structured Cabling for Voice and Data
E. Section 281600 - Extension/Modification of Existing Intrusion Detection System

1.03 REFERENCES

A. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
B. IAC 180 - Illinois Administrative Code 180.
C. Underwriters Laboratories (UL):
    1. UL 365 - Police Station Connected Burglar Alarm Units and Systems
    2. UL 609 - Local Burglar Alarm Units and Systems
    3. UL 611 - Central Station Burglar-Alarm Units
    4. UL 985 - Household Fire Warning System Units
    5. UL 1023 - Household Burglar-Alarm System Units
    6. UL 1076 - Proprietary Burglar Alarm Units and Systems
    7. UL 1610 - Central Station Burglar-Alarm Units
D. Federal Communications Commission (FCC):
    1. FCC Part 15 - Subpart B
    2. Code of Federal Regulations Title 47 - Part 15 - Radio Frequency devices
    3. Code of Federal Regulations Title 47 - Part 68 - Connection of Terminal Equipment to The Telephone Network

1.04 DEFINITIONS

A. ACS – Access Control System
B. CSA – Client Software Application
C. DGM – Dynamic Graphical Maps
D. DVS – Digital Video Server

E. ALPR – Automatic License Plate Recognition
F. SDK – Software Development Kit
G. GLM – Genetec Lifecycle Management
H. SSM – Server Software Module
I. UI – User Interface
J. USP – Unified Security Platform
K. USW – Unified Web Client
L. VMS – Video Management System

1.05 **COORDINATION/SCOPE OF WORK**

A. Contractor shall furnish and install all conduit/raceway as required for the video camera and monitoring systems. This includes all raceway explicitly shown on plans or generically required for a complete, functional system.
B. Contractor shall furnish and install all specialty backboxes for devices as required for the video camera and monitirong systems. This includes all backboxes explicitly shown on plans or generically required for a complete, functional system.
C. Contractor shall furnish and install all branch circuits required for the video camera and monitoring systems as specified. This includes all circuits explicitly shown on plans or generically required for a complete, functional system.
D. New video surveillance system to integrate seamlessly into existing genetec door monitoring and control system.
E. Video storage and all components and pieces required for a complete system are to be included. Exclusion of any required item herewithin does not exclude that requirement.

1.06 SUBMITTALS

A. Contractor shall submit all items in accordance with the requirements of Division 1, Submittals and shall include, but not be limited to the following:
    1. Model numbers of all components furnished on the job
    2. Manufacturer's catalog data sheets for all components
    3. Input power requirements for all components
    4. Complete engineered drawings indicating:
        a. Manufacturer model numbers and specifications
        b. Dimensions, layouts, installation details
        c. Point-to-point wiring diagrams for all devices
        d. Termination details for all devices
        e. Single-line system architecture drawings representing the entire system
    5. Owner acceptance form with a check box associated with each card reader and input point to indicate that each point was checked off as properly installed and reporting back to the control panel and the host computer prior to Owner acceptance of the system.
    6. 3 sets of the Manufacturer's User's Manuals and Installation Manuals.
    7. Course outlines for each of the end user training programs. The course outlines shall include the course duration, location, pre-requisites, and a brief description of the subject matter.

1.07 QUALITY ASSURANCE

A. The system programmer shall have attended manufacturer training and obtained certification in Genetec™ Security Center - Synergis™ Technical Certification.
B. Optionally, the system programmer shall have attended manufacturer training and obtained certification in Genetec Security Center - Enterprise Technical Certification.
C. New camera system software and function shall integrate with existing Genetec access control system software and function. All programing to provide a single unified software platform shall be occomplished as part of this project.
D. Additional Installer qualifications: the work of this section shall be performed by a qualified card access system contractor under the direct supervision of the Electrical Subcontractor. Minimum requirements for the card access are
    1. The installation contractor must be an Axis partner. With at least 1 Axis certified professional on staff. The successful bidder must have been an Axis partner for at least twelve months.
    2. Carries replacement parts in stock and have personnel trained in service and trouble shooting of the products specified.
    3. Experienced in installing and servicing low voltage, micro processor based systems.
    4. Installation shall be performed under the supervision of a technician trained and approved by the manufacturer of the security control panel system. Technician shall make final adjustments, check operation of the systems, certify that the final installation is in accordance with the manufacturer, and instruct the Owner on the programming, use, and operation of the systems.
    5. The video surveillance systrem contractor shall have a minimum of three (3) service personnel on call at the same time and provide service response within 24 hours.
    6. Licensed by the State of Illinois as a Private Alarm Contractor under the Private Detective, Private Alarm and Private Security Act of 1993.
E. Products: Furnish products listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and indicated.
F. Delivery, Storage and Handling
    1. Packing and shipping:
        a. Deliver items in manufacturer's original packaging.
        b. Package with bolts, screws, and fastenings for installation.
        c. Pack keys separately. Identify with Owner's name, factory order number, and contract number.
    2. Acceptance at site:
        a. Store materials above grade in a dry, well ventilated area.
G. Job Conditions
    1. Do not install electronic components until major construction work in the area is complete. Do not install in areas where dust or moisture can contaminate the working parts or where finish can be marred by construction work.

1.08 PRE-INSTALLATION MEETING

A. Arrange and attend a pre-installation meeting with the owner/architect/engineer to review system partitions, functionality and device location. Devices shall be relocated per request by design team; therefore, meeting must occur before raceway rough in. No additional compensation shall be allowed for device re-location.

B. Arrange for a meeting of trades involved in the installation. Coordinate the work to assure a complete operational system.
C. Arrange a training session for trades involved in the installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Genetec Video Management System
B. Axis Cameras
   1. See drawings for complete list of cameras. Furnish all mounting hardware as as required.
C. Qualified Bidder shall be:
   1. Pace Systems, Inc.. POC: Gene Brierton, (630) 335-9343, gbrierton@pace-systems.com
   2. Convergint/ESSCOE - POC: Matt Cook, Security Account Executive, Office 847/847-3200, Mobile 224/639-2576, matt.cook@convergint.com

2.02 VMS GENERAL REQUIREMENTS

A. The VMS shall support updating its camera drivers independent from the VMS installation. New drivers shall be released multiple times a year to extend support for new devices and features.
B. The VMS shall be based on a true open architecture that shall allow the use of non-proprietary workstation and server hardware, non-proprietary network infrastructure, and non-proprietary storage.
C. The VMS shall offer a complete and scalable video surveillance solution that shall allow cameras to be added on a unit-by-unit basis.
D. The VMS shall interface with analog-to-digital video encoders and IP cameras and with digital-to-analog video decoders, hereafter referred to as digital video servers (DVS). The VMS shall support DVS from various manufacturers.
E. The VMS shall integrate DVS using the DVS native SDK or using the following industry standards to interface to the DVS:
   1. ONVIF
F. All video streams supplied from analog cameras or IP cameras shall be digitally encoded in H.265, H.264, MPEG-4, MPEG-2, MJPEG, MxPEG, Wavelet, or JPEG2000 compression formats and recorded simultaneously in real time.
G. All audio streams supplied from IP video servers shall be digitally encoded in g711 (u-law), g721, g723, or AAC compression formats and recorded simultaneously in real time.
H. Each camera’s bit rate, frame rate, and resolution shall be set independently from other cameras in the system and altering these settings shall not affect the recording and display settings of other cameras.
I. The VMS shall be able to use multiple CCTV keyboards to operate the entire set of cameras throughout the system, including brands of cameras from various manufacturers and including their PTZ functionalities (i.e. Pelco keyboard controls Panasonic dome or vice-versa).
J. The VMS shall be able to retrieve and set the current position of PTZ cameras using XYZ coordinates.
K. The VMS shall support PTZ camera protocols from multiple manufacturers, including analog and IP protocols.
L. The VMS shall arbitrate the user conflict on PTZ usage based on user levels per camera.
M. The VMS shall support the following list of CCTV keyboard:

1. American Dynamics 2078 ASCII, and American Dynamics 2088 ASCII
2. Bosch Autodome, Bosch Intuikey
3. DVTel
4. GE ImpactNet
5. Panasonic, Pelco ASCII, Pelco KBD-300, Pelco 9760, and Pelco P.
6. Radionics
7. Hanwha Techwin SSC-100, SPC-600, SPC-2010, SPC-6000, and SPC-7000.
8. Videoalarm
9. Sony RM-NS1000
10. Panasonic WV-CU161C
11. Panasonic WV-CU950 Ethernet keyboard

N. The VMS shall support the following list of joysticks:
1. Axis 295
2. Axis T8310, T8311, T8312, T8313 Video Surveillance Control Board
3. Any USB joystick detected as a Windows Game Controller

O. The VMS shall support password change for the following list of video units:
1. Avigilon H3 and H4 series.
2. Axis: All units with firmware 6.50 or later.
3. Bosch: All units with firmware 6.30 or later.
4. Hanwha: The following series are supported:
    a. All X-Series (all firmwares)
    b. All PNx-Series (firmwares 1.01 and later)
    c. All SPE-xx10 (all firmwares), excluding SPE-100, SPE-400, SPE-101
    d. All Q-Series (all firmwares), excluding QNO-6010R, QNO-6020R, QNO-6030R, QND-6010R, QND-6020R, QND-6030R, QNV-6010R, QNV-6020R, QNV-6030R, QNE-6080RV, QNE-7080RV
    e. All L-Series (all firmwares)
    f. All TNx Series (all firmwares) excluding TNU-6320
5. ONVIF : Profile S compatible.
6. Panasonic: All units and all firmwares.

P. The VMS shall allow for the configuration of a time zone for each camera connected to a DVS. For playback review, users shall have the ability to search for video based on the following options:
1. Local time of the camera
2. Local time of the SSM
3. Local time of user's workstation
4. GMT Time
5. Other time zone

Q. Audio and Video storage configuration for the SSM shall either be:
1. Internal or external IDE/SATA/SAS organized or not in a RAID configuration.
2. Internal or external SCSI/iSCSI/Fiber Channel organized or not in a RAID configuration.
3. Within the overall storage system, it shall be possible to include disks located on:
    a. External PCs on a LAN or WAN
    b. Network Attached Servers (NAS) on a LAN or WAN

c. Storage Area Networks (SAN)

R. The SSM shall not limit the actual storage capacity configured per server.

S. Manufacturer:

1. Genetec Security Center: (Specifier, select one of the following)
   a. Omnicast Enterprise
   b. Omnicast Professional
   c. Omnicast Standard

2.03 CYBER SECURITY REQUIREMENTS

A. The USP shall be an IP enabled solution. All communication between the SSM and CSA shall be based on standard TCP/IP protocol and shall use TLS encryption with digital certificates to secure the communication channel.

B. The USP shall support user authentication with claims-based authentication using external providers. External providers shall include:

1. ADFS (Active Directory Federation Services)
2. Azure Active Directory (through OpenID Connect)
3. Ping Identity (through OpenID Connect)
4. KeyCloak (through OpenID Connect)
5. Other Open ID Connect / SAML2 authentication agents

C. The USP shall limit the IP ports in use and shall provide the Administrator with the ability to configure these ports.

D. The VMS shall support only secured media stream requests, unless explicitly configured otherwise. Secured media stream requests shall be secured with strong certificate based authentication leveraging RTSPS (RTSP over TLS). Client authentication for media stream requests is claims-based and may use a limited lifetime security token.

E. The VMS shall offer the ability to encrypt the media stream, including video, audio, and metadata with authenticated encryption. Media stream encryption shall be done at rest and in transit and be a certificate based AES 128-bits encryption. The VMS shall:

1. Allow encryption to be set on a per camera basis for all or some of the cameras.
2. Provide up to 20 different certificates for different groups of CSA or users who have been granted access to decrypted streams.
3. Not decrease the recording performance by more than 50% when encryption is enabled.
4. Use Secure RTP (SRTP) to encrypt the payload of a media stream in transit and allow multicast and unicast of the encrypted stream.
5. Use a random encryption key and change periodically.
6. Allow encrypted streams to be exported.

F. The VMS shall support end to end encrypted streams with cameras supporting Secure RTP (SRTP) both in unicast and multicast from the camera.

G. The USP shall support encryption for all communications with its databases.

H. The USP shall provide in its main user interface a visual list showing the state of all configuration items relating to the cyber security hardening of the features of the system.

I. The USP shall provide recommendations relating to the passwords used to access the hardware units in the system. The recommendation should display if the passwords used on the units are weak, average, strong, or very strong.

J. The USP shall provide the ability to manually or automatically change the video unit passwords with manufacturer's native API, standard Genetec Protocol or ONVIF. The VMS shall support password change for video units as follows:
   1. In batch or per unit
   2. On schedule
   3. From an event
   4. Based on manufacturer's policies
   5. The USP shall allow backup of last 5 passwords.
   6. The USP shall allow copying password to clipboard to be used in the device webpage if the user has the appropriate privileges.
   7. The USP shall provide the ability to export the video unit passwords if the user has the appropriate privileges.

K. The USP shall provide recommendations relating to the firmware of the hardware units enrolled in the system. Recommendations should display if the firmware is up to date, out of date, or if it has known security vulnerabilities.

2.04 FAILOVER AND STANDBY REQUIREMENTS

A. The USP shall support native and off-the-shelf failover options.

B. Failover Directory: (Specifier, additional license required per server that will failover, Enterprise only)
   1. The Standby Directory shall act as a replacement SSM on hot standby, ready to take over as the acting Directory in case the primary Directory fails. The failover shall occur in less than one minute. No action from the user shall be required.
   2. The USP shall support up to five (5) Directories on standby, lined up to take over as the acting Directory in a cascading fashion.
   3. The Standby Directory shall keep its configuration database synchronized with the primary Directory.
   4. The Standby Directory shall support disaster recovery scenarios where a server can be located in another geographic area (or building) and only take over if all other Directories become offline.
   5. The Standby Directory shall support synchronization of the configuration databases using a backup and restore mechanism. The synchronization period shall be configurable from 15 minutes to 1 week.
   6. The Standby Directory shall support real-time synchronization of the configuration databases using SQL Mirroring or SQL Always On.

C. Standby Archiver. Refer to section 2.05 Standby Archiver for more information.

D. Off-the-shelf standby/failover options (excluding the VMS Archiver) shall include: (Specifier, additional license required per server that will failover, Enterprise only)
   1. Windows Clustering
   2. NEC ExpressCluster X LAN

2.05 ARCHIVING

A. The Archiver (role) shall use an event and timestamp database for the advanced search of audio/video archives. This database shall use Microsoft SQL.

B. The Archiver shall protect archived audio/video files and the system database against network access and non-administrative user access.

C. The Archiver shall digitally sign recorded video using an EdDSA signature algorithm based on a public/private key cryptography.

D. The Archiver shall offer a plug and play type hardware discovery service with the following functionalities:
   1. Automatically discover DVS units as they are attached to the network.
   2. Discover DVS units on different network segments, including the Internet, and across routers with or without network address translation (NAT) capabilities.

E. The Archiver shall have the capacity to configure the key frame interval (I-frame) in seconds or number of frames.

F. The Archiver shall provide a pre-alarm and post-alarm recording option that can be set between one second and 5 minutes on a per camera basis.

G. The Archiver shall provide the functionality of storing of video and audio streams based on triggering events, such as:
   1. Digital motion detection
   2. Digital input activation
   3. Macros
   4. Through SDK application recording

H. The Archiver shall perform video motion detection on each individual camera based on a grid of 1320 motion detection blocks. All of the video motion detection settings are configurable on schedule. A global sensitivity threshold is available to reduce motion detection sensitivity when the video signal is noisy or when a lot of false hits are incurred. Video motion detection itself can be set into four different modes:
   1. Full Screen: All 1320 blocks on screen are activated, and a general threshold for the overall motion in the entire image can be set, and when it is reached, it can trigger recording and a motion event or a custom event.
   2. Full Screen Unit: This is the same as the Full Screen but the motion detection takes place in the DVS.
   3. Detection Zone: Six overlapping zones can be defined in the 1320 blocks on screen with each of these zones having its own threshold, and, when that threshold is reached, each one of them can trigger recording and a motion event or a custom event. Each zone triggering its own event allows for the configuration of directional motion detection events and other complex motion detection logic.
   4. Detection Zone Unit: This is the same as the Detection Zone, but the motion detection takes place in the DVS and only one zone is supported.
   5. Disabled: No motion detection is performed on this camera.

I. The Archiver shall be able to detect motion in video within 200 milliseconds and not only on key frames.

J. The Archiver shall allow for multiple recording schedules to be assigned to a single camera. Each schedule shall be created with the following parameters:
   1. Recording mode:
      a. Continuous
      b. On Motion/Manual
      c. Manual
      d. Disabled
   2. Recurrence pattern:
      a. Once on specific days
      b. Specific days on a yearly basis

c. Specific days on a monthly basis
d. Specific days on a weekly basis
e. Daily
f. All day.
g. Specific time range(s).
h. Daytime or nighttime based on the times of sunrise and sunset that are automatically calculated from the time of year and a geographical location. Provision shall be given to offset the calculated sunrise or sunset time by plus or minus 3 hours.

K. Time coverage:

L. The Archiver shall allow each camera (video source) to be encoded multiple times in the same or different video formats (H.265, H.264, MPEG-4, MPEG-2, MJPEG, MxPEG, Wavelet, or JPEG2000), limited only by the capabilities of each DVS.

M. Whenever multiple video streams are available from the same camera, users shall be free to use any one of them based on their assigned usage. The standard video stream usages are:
1. Live
2. Recording
3. Remote
4. Low resolution
5. High resolution

N. The Archiver shall allow the video quality to vary according to predefined schedules. Such schedules shall have the same configuration flexibility as the recording schedules mentioned earlier. The video quality shall be based on, but not limited to, the following parameters:
1. Maximum bit rate
2. Maximum frame rate
3. Image quality
4. Key frame interval

O. The Archiver shall have the ability to dynamically boost the quality of the "recording stream" (see previous bullet) based on specific events:
1. When recording is started manually by a user.
2. When recording is triggered by a macro, an alarm or detected motion.

P. The Archiver shall have the capacity to communicate with the DVS using 128 bits SSL encryption.

Q. The Archiver shall have the capacity to communicate with the DVS using HTTPS secure protocol.

R. The Archiver shall have the capacity to receive multicast UDP streams directly from the DVS.

S. For network topologies that restrict the DVS from sending multicast UDP streams, the Archiver shall redirect audio/video streams to active viewing clients on the network using multicast UDP.

T. The Archiver shall have the capacity to redirect audio/video streams to active viewing clients on the network using unicast UDP or TCP.

U. The Archiver shall empower the administrator with a full range of disk management options:
1. The Archiver shall allow the administrator to choose which disks to use for archiving and to set a maximum quota for each.
2. The Archiver shall allow the administrator to spread the archiving of different cameras on different disk groups (groups of disks controlled by the same controller) so that archiving could be carried out in parallel on multiple disks.

3. The Archiver shall have the capacity to move video archives to the Azure Cloud. The archives will be moved after a preset number of days.

V. The Archiver shall empower the administrator with a full range of archive management options:
   1. The Archiver shall provide a graphical representation of video sequences and recording gaps.
   2. The Archiver shall provide a way to identify the location of the video sequences.

W. The Archiver shall offer the following options to clean up old archives, on a camera by camera basis:
   1. After a preset number of days.
   2. Deleting oldest archives first when disks run out of space.
   3. Stop archiving when disks are full.

X. The Archiver shall allow important video sequences to be protected against normal disk cleanup routines.

Y. Users shall have the following options when protecting a video sequence:
   1. Until a specified date
   2. For a specified number of days
   3. Indefinitely (until the protection is explicitly removed)

Z. The Archiver shall allow the administrator to put a cap on the percentage of storage space occupied by protected video.

AA. The Archiver shall keep a log and compile statistics on disk space usage.
   1. The statistics shall be available by disk group or for the whole Archiver.
   2. The statistics shall show the percentage of protected video over the total used disk space.

BB. The Archiver shall have the capacity to down-sample video streams for storage saving purposes. The down-sampling options available are the following:
   1. For H.264, MPEG-4, and H.265, streams the down-sampling options are: all key frames, 1 fps, 2 sec./frame, 5 sec./frame, 10 sec./frame, 15 sec./frame, 30 sec./frame, 60 sec./frame, 120 sec./frame.
   2. For MJPEG streams the down-sampling options are: 15 fps, 10 fps, 5 fps, 2 fps, 1 fps, 2 sec./frame, 5 sec./frame, 10 sec./frame, 15 sec./frame, 30 sec./frame, 60 sec./frame, 120 sec./frame.

CC. The Archiver shall support DVS with edge recording capabilities and offer the following capacity:
   1. The ability to playback the video recorded on the DVS at different speeds.
   2. The ability to offload (video trickling) the video recorded on the DVS on schedule, on event, or manually to store it on the Archiver.
   3. It shall be possible to filter the video that is being offloaded using one or multiple of the following filters:
      a. Time interval
      b. Playback request
      c. Video analytic events
      d. Motion events
      e. Bookmarks
      f. Alarms
      g. Input pin events
      h. Unit offline events

DD. The Archiver shall be provided with proven performance and scalability figures:

1. The Archiver's performance shall be guaranteed during the rebuild of a disk from a raid 5 disk group. The rebuild process shall not affect the recording and playback capabilities.
2. The recommended server specification from the Genetec Security Center Hardware Requirement shall allow Archiver to perform up to 300 cameras or 300Mbs throughput first limit reached.
3. The high-performance archiver specification from the Genetec Security Center Hardware Requirement shall allow Archiver to perform: (Specifier, for prequalified machines)
    a. Up to 500 cameras or 500Mbs throughput first limit reached with a 1Gbps NIC.
    b. Up to 700 cameras or 1300Mbs throughput first limit reached with a 10Gbps NIC.

EE. The Archiver shall provide the ability to encrypt the media stream coming from the DVS including the video, audio and metadata: (Specifier, Enterprise only, additional license required)
1. Media encryption shall be optional and can be activated on a per DVS basis.
2. Media encryption shall be performed with AES 128-bits.
3. Media encryption shall encrypt all video, audio and metadata at rest and in transit. Once media encryption is turned on for a DVS all media stored or redirected by the Archiver shall be encrypted and shall require the private key to be decoded.
4. It shall be possible to export the encrypted media into a non-encrypted ASF file.

2.06 VMS MEDIA STREAMING

A. The Media Router Role shall be responsible for routing video and audio streams across local and wide area networks from the source (for example DVS) to the destination (for example CSA).
B. The Media Router Role shall support multiple transport protocols, such as unicast TCP, unicast UDP, and multicast UDP.
C. The Media Router shall support IGMP (Internet Group Management Protocol) to establish multicast group memberships:
1. IGMP v3, including SSM (Source-Specific Multicast) shall be supported.
D. The Media Router Role using Redirector Agents shall be responsible for redirecting a stream from a source IP endpoint to a destination IP endpoint.
E. The Redirector Agents shall be capable of converting a stream from and to any supported transport protocols:
1. Multicast UDP to Unicast TCP
2. Multicast UDP to Unicast UDP
3. Unicast TCP to Multicast UDP
4. Unicast UDP to Multicast UDP
F. It shall be possible to limit the number of concurrent live and playback video redirections for each Redirector Agent in order to better control the bandwidth across multiple sites.
G. It shall be possible to limit the bandwidth consumed by live and playback video from the CSA to better control the bandwidth across multiple sites. The SSM shall be able to prioritize video streaming to the CSA based on user level.
H. It shall be possible to protect the Media Router Role against hardware or software unavailability by configuring another Media Router Role to act as a hot standby server.
I. Multiple Redirector Agents shall be used on a large VMS installation to increase the service availability and to provide automatic load balancing.

2.07 VMS VIDEO ARCHIVES TRANSFER CAPABILITIES

A. Archive transfer shall provide the ability to:
   1. Transfer video from a server to another server in the same system.
   2. Transfer video from a federated server to another server.
   3. Transfer video from camera storage to a server.
B. It shall be possible to program video transfers either on a recurrent schedule, or to trigger them manually or upon connection.
C. It shall be possible to filter the video of interest for a transfer. The video of interest shall be defined with the following filters:
   1. All archives when the camera was offline.
   2. Alarms.
   3. Playback request from the edge.
   4. Video analytics events.
   5. Motion events.
   6. Bookmarks.
   7. Input triggers.
   8. Time range.
D. It shall be possible to define the length of video before and after the event used as a filter to determine the video of interest.
E. The USP shall offer an interface for displaying all video archive transfer requests. This interface shall display all the current, requested and scheduled video transfer requests. It shall be possible to edit, trigger, and cancel video archive transfers from this interface.
F. The USP shall offer an interface for querying past video transfers and their outcome.

2.08 SECURITY VIDEO ANALYTICS

A. The analytics shall be completely unified with the Video Management System.
B. Configuration shall natively be performed in the configuration interface of the Video Management System.
C. The analytics shall feature dedicated configuration possibilities for the following scenarios:
   1. Perimeter protection
   2. Area protection
   3. Direction control
   4. Object detection
   5. Stopped vehicle detection
   6. Tailgating Detection
      a. Trigger an alarm if a motion pattern moves from zone A (source) through zone B into zone C (sink).
      b. Trigger an alarm if a motion pattern moves anywhere inside a specified zone.
D. Each of the scenarios shall trigger events in the Video Management System, which correspond to their functionality.
E. Additional to these scenarios, the analytics shall allow to configure custom intrusion detection and object detection scenarios as well as allow to import settings to allow maximum flexibility.
F. The analytics license shall allow to configure any one of these scenarios per camera.
G. The analytics shall allow at least two different detection variants:

H. The analytics shall support an unlimited number of detection areas.
I. The analytics feature rain-filters to filter out disturbances.
J. The analytics shall feature live configuration to immediately see the effects of parameter changes in the configuration interface without prior saving new configurations.
K. The configuration of the analytics shall be possible on recorded video streams.
L. The analytics shall offer the possibility to configure object movement paths.
M. The analytics shall not employ tripwires or cross-lines.
N. Areas and the scenes perspective (near & far object size) shall be configured on-screen using a point-and-click interface.
O. The analytics shall feature filters for movement speed, distance, and direction to detect events.
P. The analytics shall feature options to separately show or hide areas, area names, and detection overlays.
Q. The analytics shall be fully server-based, with no calculation on cameras necessary.
R. The analytics shall operate with color, thermal, and infrared cameras.
S. The accuracy of the analytics shall be evaluated and approved by the CPNI Video Analytics Assessment Programme and shall be listed in the CPNI Catalogue of Security Equipment (CSE).

2.09 GENERAL CLIENT SOFTWARE REQUIREMENTS

A. The Client Software Applications (CSA) shall provide the user interface for USP configuration and monitoring over any network and be accessible locally or from a remote connection.
B. The CSA shall consist of the Configuration UI for system configuration and the Monitoring UI for monitoring. The CSA shall be Windows-based and provide an easy-to-use graphical user interface (UI).
C. The CSA for monitoring shall support running in 64-bit mode.
D. The Server Administrator shall be used to configure the server database(s). It shall be web-based and accessible locally on the SSM or across the network.
E. The CSA shall seamlessly merge access control, license plate recognition (ALPR), and video functionalities within the same user application.
F. The USP shall use the latest user interface (UI) development and programming technologies such as Microsoft WPF (Windows Presentation Foundation), the XAML markup language, and the .NET software framework.
G. All applications shall provide an authentication mechanism, which verifies the validity of the user. As such, the administrator (who has all rights and privileges) can define specific access rights and privileges for each user in the system.
H. Logging on to a CSA shall be done either through locally stored USP user accounts and passwords or using the operator's Windows credentials when Active Directory integration is enabled. (Specifier, Professional and up, additional license required for Active Directory)
I. When integrated with Microsoft's Active Directory, the CSA and USP shall authenticate users using their Windows credentials. As a result, the USP will benefit from Active Directory password authentication and strong security features. (Specifier, Professional and up, additional license required)
J. When integrated with an external identity provider such as Windows Active Directory, ADFS (Active Directory Federation Services) or an Open ID Connect/SAML2 identity provider (ex.: Azure AD), the CSA and USP shall authenticate using a Single-Sign On experience to the users. As a result, the USP will benefit from reusing the same credential throughout enterprise applications. (Specifier, Professional and up, additional license required)

K. To enhance usability and operator efficiency, the Configuration UI and Monitoring UI shall support many of the latest UI such as:
   1. A customizable Home Page that includes favorite and recently used tasks.
   2. Task-oriented approach for administrator/operator activities where each type of activity (surveillance, visitor management, individual reports, and more) is an operator task.
   3. Consolidated and consistent workflows for video, ALPR, and access control.
   4. Single click functionality for reporting and tracking. The Monitoring UI shall support both single-click reporting for access control, ALPR, and video, as well as single-click tracking of areas, cameras, doors, zones, cardholders, elevators, ALPR entities, and more. Single-click reporting or tracking shall create a new task with the selected entities to report on or track.

L. Configuration UI and Monitoring UI Home Page and Tasks
   1. The Configuration UI and Monitoring UI shall be task-oriented.
   2. A task shall be user interface design patterns whose goal is to simplify the user interface by grouping related features from different systems, such as video and access, in the same display window. Features shall be grouped together in a task based on their shared ability to help the user perform a specific task.
   3. Tasks shall be accessible via the Home Page of either the Configuration or the Surveillance CSA.
   4. Newly created tasks shall be accessible via the Configuration UI or the Monitoring UI taskbar.
   5. Similar tasks shall be grouped into the following categories:
      a. Operation: Access control management, LRP management, and more.
      b. Investigation: Video bookmark/motion/archive reports, access control activity reports, visitor activity reports, alarm reports, ALPR activity reports, and more.
      c. Maintenance: Access control and video configuration reports, troubleshooters, audit trails, health-related reports, and more.
   6. An operator shall be able to launch a specific task only if they have the appropriate privileges.
   7. The Home Page content shall be customizable through the use of privileges to hide tasks that an operator should not have access to and through a list of favorite and recently used tasks. In addition, editing a USP XML file to add new tasks on the fly shall also be possible.

M. The Contractor shall provide up to XX number of simultaneous Clients. (Specifier, client connections are concurrent, the first 5 client connections are included, specify a Site License after 40 client connections (Enterprise only))

2.10 CONFIGURATION USER INTERFACE (UI)

A. General:
   1. The Configuration UI application shall allow the administrator or users with appropriate privileges to change the system configuration. The Configuration UI shall provide decentralized configuration and administration of the USP system from anywhere on the IP network.
   2. The configuration of all embedded ACS, VMS, and ALPR systems shall be accessible via the Configuration UI.
   3. The Configuration UI shall have a home page with single-click access to various tasks.

4. The Configuration UI shall include a variety of tools such as troubleshooting utilities, import tools, and a unit discover tool, amongst many more.
5. The Configuration UI shall include a static reporting interface to:
    a. View historical events based on entity activity. The user shall be able to perform such actions as printing a report and troubleshooting a specific access event from the reporting view.
    b. View audit trails that show a history of user/administrator changes to an entity.
6. Common entities such as users, schedules, alarms and many more, can be reused by all embedded systems (ACS, VMS, and ALPR).

B. Video management system:
1. The Configuration UI shall allow the administrator or users with appropriate privileges to change video configuration.
2. The Configuration UI shall provide the ability to change video quality, bandwidth, and frame rate parameters on a per camera (stream) basis for both live and recorded video.
3. The Configuration UI shall provide the ability to change video quality by a selection of predefined video quality template.
4. The Configuration UI shall provide the ability to configure brightness, contrast, and hue settings for each camera on the same DVS.
5. The Configuration UI shall provide the capability to enable audio recording on DVS units that support audio.
6. The Configuration UI shall provide the ability to change the audio parameters, serial port and I/O configuration of individual DVS units.
7. The Configuration UI shall provide the capability to rename all DVS units based on system topology and to add descriptive information to each DVS.
8. The Configuration UI shall provide the ability to set recording schedules and modes for each individual camera. The recording mode can be:
    a. Continuous
    b. On motion and Manual
    c. Manual only
    d. Disabled
9. The Configuration UI shall support the creation of schedules to which any of the following functional aspects can be attached:
    a. Video quality (for each video stream per camera)
    b. Recording (for each camera)
    c. Motion detection (for each detection zone per camera)
    d. Brightness, Contrast, and Hue (for each camera)
    e. Camera sequence execution
10. The Configuration UI shall support the creation of unlimited recording schedules and the assigning of any camera to any schedule.
11. The Configuration UI shall detect and warn user of any conflict within assigned schedules.
12. The Configuration UI shall provide the capability to set a PTZ protocol to a specific DVS serial port and shall allow mixing domes of various manufacturers within a system.
13. User shall have the ability to configure a return to home function after a predefined time of inactivity for PTZ cameras. This period of inactivity time shall be configurable from 1 to 7200 seconds.

2.11 VMS CLIENT USER INTERFACE (UI)

A. The Monitoring UI shall fulfill the role of a Unified Security Interface that is able to monitor video, ALPR, and access control events and alarms, as well as view live and recorded video.

B. The Monitoring UI shall provide a graphical user interface to control and monitor the USP over any IP network. It shall allow administrators and operators with appropriate privileges to monitor their unified security platform, run reports, and manage alarms.

C. To enhance usability and operator efficiency, the Monitoring UI shall support the following UI concepts:
   1. Dynamically adaptive interface that adjusts in real-time to what the operator is doing.
   2. A dynamic controls section loaded with entity-specific widgets (e.g. door and camera widgets).
   3. Use of transparent overlays that can display multiple types of data in a seamless fashion.
   4. Display tile menus and quick commands.
   5. Consolidated and consistent workflows.
   6. Tile menus and quick commands easily accessible within every display tile of the user workspace.
   7. Single click functionality for reporting and tracking. The Monitoring UI shall support both single-click reporting for access control, ALPR, and video, as well as single-click tracking of areas, cameras, doors, zones, cardholders, elevators, ALPR entities, and more. Single-click reporting or tracking shall create a new task with the selected entities to report on or to track.

D. Monitoring UI Home Page and Tasks:
   1. Similar tasks shall be grouped into the following categories:
      a. Operation: Access control/LRP/video surveillance, visitor management, mustering, access control and video alarm monitoring, and more.
      b. Investigation: Video bookmark/motion/archive reports, access control activity reports, visitor activity reports, alarm reports, ALPR activity reports, and more.
      c. Maintenance: Access control and video configuration reports, troubleshooters, audit trails, and more.

E. Dynamically Adaptive UI, Controls section, and Widgets:
   1. The Monitoring UI shall dynamically adapt to what the operator is doing. This shall be accomplished through the concept of widgets that are grouped in the Monitoring UI Controls section.
   2. Widgets shall be mini-applications or mini-groupings in the Monitoring UI Controls section that let the operator perform common tasks and provide them with fast access to information and actions.
   3. With a single click on an entity (for example door or camera) the specific widgets associated to that entity appear and other non-relevant widgets disappear dynamically (instantly). Widgets shall bring the operator information such as door status and camera stream information, as well as user actions, such as door unlock, PTZ controls, and more.
   4. Specific widgets include those for a door, camera, alarm, zone, display tile, video stream (statistics), PTZ camera, and more.

F. Operator Workflows:
   1. A workflow shall be a sequence of operations an operator or administrator shall execute to complete an activity. The “flow” relates to a clearly defined timeline or sequence for executing the activity.

2. The Monitoring UI shall be equipped with consistent workflows for the ALPR, video, and access control systems that it unifies.
3. Generating or printing a report, setting up or acknowledging an alarm, or creating an incident report shall follow the same process (workflow) whether the operator is working with video, ALPR, or access control, or with both video and access control.

G. Each task within the Monitoring UI shall consist of one or more of the following items:
1. Event list.
2. Logical tree: Doors, cameras, zones, ALPR units, and elevators shall be grouped under Areas in a hierarchical fashion.
3. Entities list of all entities being tracked.
4. Display tiles with various patterns (1 x 1, 2 x 2, and more).
5. Display tile menu with various commands related to cameras, doors, PTZ, and tile controls.
6. Controls section with widgets.

H. The Monitoring UI shall support multiple event lists and display tile patterns, including:
1. Event/alarm list layout only
2. Display tile layout only
3. Display tile and alarm/event list combination
4. ALPR map and alarm/event list combination

I. User workspace customization
1. The user shall have full control over the user workspace through a variety of user-selectable customization options. Administrators shall also be able to limit what users and operators can modify in their workspace through privileges.
2. Once customized, the user shall be able to save his or her workspace.
3. The user workspace shall be accessible by a specific user from any client application on the network.
4. Display tile patterns shall be customizable.
5. Event or alarm lists shall span anywhere from a portion of the screen up to the entire screen and shall be resizable by the user. The length of event or alarm lists shall be user-defined. Scroll bars shall enable the user to navigate through lengthy lists of events and alarms.
6. The Monitoring UI shall support multiple display tile patterns (for example one display tile (1x1 matrix), 16 tiles (8x8 matrix), and multiple additional variations).
7. The Monitoring UI shall support as many monitors as the PC video adapters and Windows Operating System are capable of accepting.
8. Additional customization options include show/hide window panes, show/hide menus/toolbars, show/hide overlaid information on video, resize different window panes, and choice of tile display pattern on a per task basis.

J. The Monitoring UI shall provide an interface to support the following tasks and activities common to access control, ALPR, and video:
1. Monitoring the events from a live security system (ACS and/or VMS and/or ALPR).
2. Generating reports, including custom reports.
3. Monitoring and acknowledging alarms.
4. Creating and editing incidents and generating incident reports.
5. Displaying dynamic graphical maps and floor plans as well as executing actions from dynamic graphical maps and floor plans.

6. Displaying dynamic graphical maps and floor plans as well as executing actions from dynamic graphical maps and floor plans.
7. Management and execution of hot actions and macros.

K. The Monitoring UI shall be able to monitor the activity of the following entities in real-time: areas, ALPR entities, doors, elevators, cameras, cardholders, cardholder groups, zones (input points), and more.

L. The Monitoring UI shall include advanced video capabilities, including:
1. Advanced live video viewing functionality.
2. Advanced archive playing and video playback functionality.
3. Monitoring and management of video system events and alarms.
4. Intercom or duplex audio.
5. Generation of video reports.
6. Control of PTZ cameras.
7. Creating and monitoring archive transfer requests.
8. Display metadata overlaid on live or playback video.

M. The Monitoring UI shall leverage the Graphical Processing Unit (GPU) for video decoding.
1. The following GPU technologies shall be supported:
   a. NVidia CUDA
   b. Intel Quick Sync
2. The Monitoring UI shall have the ability to decode video through the optimal simultaneous use of the GPU and Computer Processing Units (CPU).

N. The live video viewing capabilities of the Monitoring UI shall include:
1. The ability to display all cameras attached to the USP and all cameras attached to federated systems.
2. Support for live video monitoring on each and every display tile within a task in the user's workspace.
3. The USP shall support uninterrupted video streaming. The CSA shall keep existing video connections active in the event that an SSM (except Archiver) becomes unavailable.
4. The USP shall support uninterrupted video streaming. The CSA shall keep existing video connections active in the event that an SSM (except Archiver) becomes unavailable.
5. The ability to drag and drop a camera into a display tile for live viewing.
6. The ability to drag and drop a camera into a display tile for live viewing on an analog monitor connected to an IP hardware decoder (converting an IP encoded stream into an analog video signal).
7. The ability to drag and drop a camera from a map into a display tile for live viewing.
8. Support for digital zoom on live camera video streams.
9. The ability for audio communication with video units with audio input and output.
10. The ability to control pan-tilt-zoom, iris, focus, and presets.
11. The ability to bookmark important events for later retrieval on any archiving camera and to uniquely name each bookmark in order to facilitate future searches.
12. The ability to bookmark important events for later retrieval on any archiving camera and to uniquely name each bookmark in order to facilitate future searches.
13. The ability to start/stop recording on any camera in the system that is configured to allow manual recording by clicking on a single button.
14. The ability to activate or de-activate viewing of all system events as they occur.

15. The ability to switch to instant replay of the video for any archiving camera with the simple click of button.
16. The ability to take snapshots of live video and be able to save or print the snapshots.
17. The ability to view the same camera multiple times in different tiles.

O. The video playback (archive playing) capabilities of the Monitoring UI shall include:
1. Support for audio and video playback for any time span.
2. Support for video playback on each and every display tile.
3. The ability to instantly replay the video for any archiving camera with the simple click of a button.
4. The ability to select between instant synch of all video streams in playback mode, allowing operators to view events from multiple angles or across several camera fields, or non-synchronous playback.
5. The ability to simultaneously view the same camera in multiple tiles at different time intervals.
6. The ability to control playback with:
    a. Pause
    b. Lock Speed
    c. Forward and Reverse Playback at: 1x, 2x, 4x, 6x, 8x, 10x, 20x, 40x, 100x
    d. Forward and Reverse Playback frame by frame
    e. Slow Forward and Reverse Playback at: 1/8x, 1/4x, 1/3x, 1/2x
    f. Loop playback between two time markers
7. The ability to display a single timeline or one timeline for each selected video stream, which would allow the operator to navigate through the video sequence by simply clicking on any point in the timeline.
8. The ability to display the level of motion at any point on a timeline.
9. The ability to clearly display bookmarked events on the timeline(s).
10. The ability to query archived video using various search criteria, including, but not limited to, time, date, camera, and area.
11. The tool necessary for searching video and associated audio based on user-defined events or motion parameters.
12. The ability to define an area of the video field in which to search for motion as well as define the amount of motion that will trigger search results. The Monitoring UI shall then retrieve all archived video streams that contain motion that meets the search parameters. There shall be a graphical timeline on which the time of each search hit shall be indicated.
13. The ability to browse through a list of all bookmarks created on the system and select any bookmarked event for viewing.
14. The ability to add bookmarks to previously archived video for easier searching and retrieval.
15. Support for digital zoom on playback video streams.
16. Still image export to PNG, JPEG, GIF, and BMP format with Date and Time stamp, and Camera Name on the image (snapshot).
17. Still image export to PNG, JPEG, GIF, and BMP format with Date and Time stamp, and Camera Name on the image (snapshot).
18. Tools for exporting video and a self-contained video player on various media such as USB keys or CD/DVD-ROM. This video player shall be easy to use without training and shall

still support reviewing video metadata, such as bookmark, or navigating the video with functions like panoramic camera view dewarping.

19. Tools for exporting video sequences in standard video formats, such as ASF or MP4.
20. The ability to encrypt exported video files.
21. The ability for an operator to load previously exported video files from their computer or network.
22. The ability for queries to be saved upon closing the CSA and reappear when the application is reopened.
23. The ability to dynamically block, on demand, video stream dynamically to lower level users to prevent access, for a specific time, to live and recorded video.
24. A tool building and exporting a set of videos into a single container. This tool shall allow the operator to build sequences of video to create a storyboard and allow the export of synchronous cameras.
25. The ability to store the video export and still image export at a pre-defined storage location.
26. An interface with the ability to list, search, and manipulate previously generated video exports.
27. The ability to export sequences of video in open standards including ASF and MP4.

P. Entity Monitoring:
   1. The USP shall permit the user to select multiple entities to monitor from the Monitoring UI by adding the entities one by one to the tracking list.
   2. The Monitoring UI shall provide the option to filter which events shall be displayed in the display tile layout and/or event list layout.
   3. It shall be possible to lock a Monitoring UI display tile so that it only tracks the activity of a specific entity (e.g. specific door or camera).
   4. The user shall be able to drag and drop an event from an event list (or an alarm from an alarm list) onto a display tile to view a license plate read, cardholder picture ID, badge ID, or live/archived video, among other options.
   5. Event, alarm, monitoring/tracking, and report lists shall contain cardholder pictures where applicable.
   6. The user shall be permitted to start or pause the viewing of events within each display tile.

Q. Display Tile Packing and Unpacking:
   1. The Monitoring UI shall support single-click unpacking and packing for ALPR hits, ALPR reads, areas, doors, zones, camera sequences, and alarms.
   2. The packing and unpacking of entities shall allow operators to quickly obtain additional information and camera views of a specific entity.
   3. The unpacking of an entity shall display associated entities. For example, unpacking a door with multiple associated cameras shall display all cameras associated with that door. Unpacking shall reconfigure the display tiles to be able to display all associated entities. For example, unpacking a door (or a zone or alarm) that is currently in a 1 x 1 tile configuration and that has 3 cameras tied to it will create a 1 x 3 display tile arrangement for viewing all associated entities.
   4. Packing will return the display to the original tile pattern.

R. Visual Tracking:
   1. The Monitoring UI shall support the ability to manually track a moving target with the single click of a button.

2. The ability to switch from one camera view to an adjacent camera shall be done within a single display tile.
3. Switching between camera streams shall be accomplished by simply clicking on a semi-transparent shape or overlay.
4. Visual tracking shall be available with both live and recorded video.

2.12 SERVER ADMINISTRATOR USER INTERFACE REQUIREMENTS

A. The Server Administrator shall be used to configure the SSM and the Directory Role (main configuration) and its database(s), to apply the license, and more.
B. The Server Administrator shall be a web-based application. Through the Server Administrator, it shall be possible to access the SSM across the network or locally on the server.
C. Access to the Server Administrator shall be protected via login name, password, and encrypted communications.
D. The Server Administrator shall allow the administrator (user) to perform the following functions:
    1. Manage the system license.
    2. Configure the database(s) and database server for the Directory Role,
    3. Activate/Deactivate the Directory Role.
    4. Manually back up the Directory Role database(s) and/or restore the server database(s), as well as configure scheduled backups of the databases.
    5. Define the client-to-server communications security settings.
    6. Configure the network communications hardware, including connection addresses and ports.
    7. Configure system SMTP settings (mail server and port).
    8. Configure event and alarm history storage options.

2.13 UNIFIED WEB CLIENT (UWC) GENERAL REQUIREMENTS

A. The USP shall support a unified web client (UWC) for access control and video.
B. The UWC shall be a truly thin client with no download required other than an internet web browser or standard web browser plugins.
C. The UWC shall be platform independent and run within Microsoft Edge, Internet Explorer, Firefox, Safari, and Google Chrome.
D. Web pages for the web client shall be managed and pushed by the Web Server Role. Microsoft IIS or any other web hosting service shall not be required given that all the web pages shall be hosted by the Web Server Role.
E. The UWC shall support display on tablet format.
F. The UWC shall support native H.264 video in the web client.
G. Web pages for the web client shall be managed and pushed by the Web Client Server. Microsoft IIS or any other web hosting service shall not be required given that all the web pages shall be hosted by the Mobile Server.
H. The Contractor shall provide up to XX number of simultaneous Web Clients. (Specifier, web client connections are concurrent, the first 5 web client connections are included, specify a Site License after 40 web client connections (Enterprise only))
I. The Web Client Server shall provide the ability to define a unique URL to access the web client, to ensure the security of the application.
J. The UWC shall provide the ability to load a camera layout.

K. The UWC shall provide the ability to configure, save, and reload private camera layouts.
L. The UWC shall provide the ability to control PTZ cameras.
M. Functionalities:
    1. Log in support shall be available using:
        a. username and password
        b. Active Directory. (Specifier, Professional and up, additional license required for Active Directory)
        c. Azure Active Directory, ADFS, OpenID Connect or SAML2 identity provider. (Specifier, Professional and up, additional license required for OIDC & SAML2)
        d. Ability for user to change their password.
    2. Encrypted communications for all transactions.
    3. Print reports and export to CSV file.
    4. Customer logo customization shall be available for multi-tenant and hosted services applications.
    5. Video:
        a. Live and playback video at 320 x 240, 640 x 480 or 1280 x 1024 @ 15 fps
        b. Video export
        c. 1, 4, 6 or 9 tiles
        d. Basic PTZ Controls (Pan/Tilt, Zoom, go to presets, start pattern)
        e. Start / Stop recording
        f. Sample web page for customers to see how to view video for their own development
        g. Add bookmarks
    6. Alarms:
        a. Alarm report
    7. Threat Level.

2.14 SMARTPHONE AND TABLET APP GENERAL REQUIREMENTS

A. The USP shall support mobile apps for various off-the-shelf devices. The mobile apps shall communicate with the Mobile Server of the USP over any Wi-Fi or cellular network connection.
B. Mobile apps shall communicate with the USP via a Mobile Server Role (MSR). All communication between the mobile apps and MSR shall be based on standard TCP/IP protocol and shall use the TLS encryption with digital certificates to secure the communication channel.
C. Supported device manufacturers shall include (refer to Mobile App specifications for latest compatibility list):
    1. Apple devices running iOS 11.0 or later
    2. Android devices 6.0 or later
D. It shall be possible to download the mobile apps from the Central application store (Apple iTunes App Store, Google Play).
E. It shall be possible to push configuration to the mobile devices through a Mobile Device Management solution such as VMWare Workspace One or Microsoft Intune.
F. Functionalities:
    1. Core
        a. Ability to logon/logoff to the USP using an authorized user profile of the system.
        b. Ability to support passive authentication from a single sign-on provider (OpenID Connect or SAML2 identity provider).

c. Ability to use biometric features (thumbprint, face ID, etc.) to perform connection to the system.
d. Ability to change the picture or the password of the user of the mobile app.
e. Ability to view the current Threat Level of the system.
f. Ability to change the current Threat Level of the system.
g. Ability to execute hot actions configured in the user profile.
h. Ability to view entities from the USP:
    1) Cameras
    2) Doors
    3) ALPR cameras
    4) Web Tile Plugins
    5) Layouts
    6) Camera Sequences
    7) Macros
    8) Maps (geographical maps only) (Specifier, additional license required, Plan Manager Advanced)
i. Ability to navigate the system hierarchical view of the entities and search entities in the system.

2. Video
    a. Ability to view live and recorded video from the cameras of the USP. A maximum of four cameras shall be displayed.
    b. Ability to view video in native format (H.264).
    c. Ability to display live and recorded video side-by-side for a specific camera.
    d. Ability to perform digital zoom on cameras.
    e. Ability to perform actions on cameras such as add a bookmark, control a PTZ, control the iris/focus function, save a snapshot, start/stop recording.
    f. Ability to view camera layouts.
    g. Ability to view camera sequences.
    h. Ability to run a camera events report.
    i. Ability to change the video quality on the cameras displayed on the mobile app.
    j. Ability to use the camera of the smartphone and stream a live video feed to a video recorder in the system.
3. Access Control
    a. Ability to view the door state ad door lock state.
    b. Ability to perform actions on a door such as unlock the door, set the door in maintenance mode, override the door unlocking schedule.
4. Automatic License Plate Recognition
    a. Ability to view live events raised by an ALPR camera.
    b. Ability to view the read image, context image, and all metadata captured by the ALPR camera.
    c. Ability to run an ALPR event report.
    d. Ability to add a license plate to a hotlist on the system.
5. Alarm Management

a. Ability to receive push notifications to notify mobile operators that an alarm was received.
b. Ability to view all active alarms assigned to the mobile operator.
c. Ability to perform action on an alarm such as acknowledge, forward, or alternate-acknowledge an active alarm.
d. Ability to view entities attached to the alarm.

6. Map (Specifier, additional license required, Plan Manager Advanced)
a. Ability to display a geographic map with USP entities geo-located on the map.
b. Ability to view any entity configured on the map.
c. Ability to search entities or location on the map.

G. It shall be possible to send a message from the client user interface to a mobile operator.
H. It shall be possible to send a live or playback video sequence from the client UI to a mobile operator.
I. It shall be possible to view mobile operators who enabled location tracking on a map in the system. The location of the mobile operator should be updated in real time. (Specifier, additional license required, Plan Manager Advanced)

2.15 HEALTH MONITOR

A. The USP shall monitor the health of the system, log health-related events, and calculate statistics.
B. USP services, roles, agents, units, and client apps will trigger health events.
C. The USP shall populate the Windows Event Log with health events related to USP roles, services, and client apps.
D. A dedicated role, the Health Monitoring Role, shall perform the following actions:
1. Monitor the health of the entire system and log events.
2. Calculate statistics within a specified time frame (hours, days, months).
3. Calculates availability for clients, servers and video/access/ALPR units.

E. A Health Monitoring task and Health History reporting task shall be available for live and historical reporting.
F. A Health Monitoring dashboard task shall be available in the client application user interface to provide a live display, such as pie charts and event lists, for quick visual assessment on the general health of the system.
G. A web-based, centralized health dashboard shall be available to remotely view unit and role health events of the USP.
H. Detailed system care statistics will be available through a web-based dashboard providing health metrics of USP entities and roles, including Uptime and mean-time-between-failures.
I. All health events raised in the system can be used for automating the USP event/action management.
J. Health events shall be accessible via the SDK (can be used to create SNMP traps).

2.16 USP GENERAL REQUIREMENTS

A. The Unified Security Platform (USP) shall be an enterprise class IP-enabled security and safety software solution.
B. The USP shall support the seamless unification of IP access control system (ACS), IP video management system (VMS), and IP automatic license plate recognition system (ALPR) under a single platform. The USP user interface (UI) applications shall present a unified security

interface for the management, configuration, monitoring, and reporting of embedded ACS, VMS, and ALPR systems and associated edge devices.

C. Functionalities available with the USP shall include:
   1. Configuration of embedded systems, such as ACS, ALPR, and VMS systems.
   2. Live event monitoring.
   3. Live video monitoring and playback of archived video.
   4. Alarm management.
   5. Reporting, including creating custom report templates and incident reports.
   6. The Federation feature for global monitoring, reporting, and alarm management of multiple remote and independent ACS, VMS, and/or ALPR systems spread across multiple facilities and geographic areas. (Specifier, Enterprise only, additional license required)
   7. Global cardholder management across multiple facilities and geographic areas each with their own independent ACS system. (Specifier, Enterprise Only, additional license required for each site)
   8. Microsoft Active Directory integration for synchronizing USP user accounts and ACS cardholder accounts. (Specifier, Professional and up, additional license required)
   9. Intrusion device and panel integration (live monitoring, reporting, and arming/disarming). (Specifier, Standard, Professional and up, additional license required)
   10. SIP Intercom device integration for bi-directional communication. (Specifier, all versions, additional license required)
   11. Integration with third party systems and databases via plug-ins (access control, video analytics, point of sale, and more). (Specifier, Professional and up, additional license required)
   12. Dynamic graphical map viewing.
   13. Asset management system integration. (Specifier, Professional and up, additional license required)

D. The USP shall be deployed in one or more of the following types of installations:
   1. Unified access, ALPR, video platform, and any combination thereof.
   2. Standalone access control, ALPR, or video platform.
   3. Unified access and video platform that federates multiple remote ACS, VMS, ALPR.
   4. Standalone video platform that federates multiple independent remote VMS.
   5. Standalone access control that federates multiple independent remote ACS.
   6. Standalone access control that federates multiple independent remote ALPR.

E. Licensing:
   1. A single central license shall be applied centrally on the configuration server.
   2. There shall be no requirement to apply a license at every server computer or client workstation.
   3. Based on selected options, one or more embedded systems shall be enabled or disabled.

F. Hardware and Software Requirements:
   1. The USP and embedded systems (video, license plate recognition, and access control) shall be designed to run on a standard PC-based platform loaded with a Windows operating system. The preferred operating system shall be coordinated with the Owner following the manufacturer supported operating systems.
   2. The core client/server software shall be built in its entirety using the Microsoft .NET software framework and the C# (C-Sharp) programming language.

3. The USP database server(s) shall be built on Microsoft's SQL Server. The preferred SQL version shall be coordinated with the Owner and compatible with the USP.
4. The USP shall be compatible with virtual environments, including VMware and Microsoft Hyper-V.
5. The USP shall use the latest user interface (UI) development and programming technologies such as Microsoft WPF (Windows Presentation Foundation), the XAML markup language, and .NET software framework.

2.17 USP ARCHITECTURE

A. The USP shall be based on a client/server model. The USP shall consist of a standard Server Software Module (SSM) and Client Software Applications (CSA).
B. The USP shall be an IP enabled solution. All communication between the SSM and CSA shall be based on standard TCP/IP protocol and shall use TLS encryption with digital certificates to secure the communication channel.
C. The SSM shall be a Windows service that can be configured to start when the operating system is booted and run in the background. The SSM shall automatically launch at computer startup, regardless of whether or not a user is logged on the machine.
D. Users shall be able to deploy the SSM on a single server or across several servers for a distributed architecture. The USP shall not be restricted in the number of SSM deployed.
E. The USP shall support the concept of The Federation feature whereby multiple independent ACS, VMS, and ALPR installations can be merged into a single large virtual system for centralized monitoring, reporting, and alarm management. (Specifier, Enterprise only, additional license required)
F. The USP shall protect against potential database server failure and continue to run through standard off-the-shelf solutions.
G. The USP shall support up to one thousand instances of CSA connected at the same time. However, an unrestricted number of CSA can be installed at any time. (Specifier, Maximum 5 with Standard; Maximum 10 with Professional; Unrestricted with Enterprise)
H. The USP shall support an unrestricted number of logs and historical transactions (events and alarms) with the maximum allowed being limited by the amount of hard disk space available.
I. The USP shall support uninterrupted video streaming. The CSA shall keep existing video connections active in the event that an SSM (except Archiver) becomes unavailable.
J. Roles-Based Architecture:
    1. The USP shall consist of a role-based architecture, with each SSM hosting one or more roles.
    2. Each role shall execute a specific set of tasks related to either core system, automatic license plate recognition (ALPR), video (VMS), or access control (ACS) functionalities, among many others. Installation shall be streamlined through the ability of the USP to allow administrators to:
        a. Deploy one or several SSM across the network prior to activating roles.
        b. Activate and deactivate roles as needed on each and every SSM.
        c. Centralize role configuration and management.
        d. Support remote configuration.
        e. Move roles over from one SSM to another.
    3. Each role, where needed, shall have its own database to store events and role-specific configuration information.

4. Roles without databases, such as The Federation feature, Active Directory, and Global Cardholder Management, shall support near real-time standby without any third party failover software being required.
5. Directory Role:
    a. The Directory Role shall manage the central database that contains all the system information and component configuration of the USP.
    b. The Directory Role shall authenticate users and give access to the USP based on predefined user access rights or privileges, and security partition settings.
    c. The Directory Role shall support the configuration/management of the following components common to the ACS, ALPR, and VMS sub-systems:
        1) Security Partitions, users and user groups
        2) Areas
        3) Zones, input/output (IO) linking rules, and custom output behavior
        4) Alarms. Schedules, and scheduled tasks
        5) Custom events
        6) Macros or custom scripts
    d. The Directory Role shall support the configuration/management of the following components specific to VMS:
        1) Video servers and their peripherals (e.g. audio, IOs, and serial ports)
        2) PTZ
        3) Camera sequences
        4) Recording and archiving schedules
    e. The Directory Role shall support the configuration/management of the following components specific to ACS:
        1) Door controllers, and input and output (IO) modules
        2) Doors, Elevators, and Access rules
        3) Cardholders and cardholder groups, credentials, and badge templates
    f. The Directory Role shall support the configuration/management of the following components specific to ALPR:
        1) ALPR units and cameras
        2) Hotlists, permit lists, and overtime rules
6. The Video Archiver Role shall be responsible for managing cameras and encoders under its control and archiving.
7. The Media Router Role shall be responsible for routing video and audio streams across local and wide area networks from the source (for example DVS) to the destination (for example CSA).
8. The Access Manager Role shall be responsible for synchronizing access control hardware units under its control, such as door controllers and I/O modules. This role shall also be responsible for validating and logging all access activities and events when the door controllers and I/O modules are online.
9. The Automatic License Plate Recognition (ALPR) Role shall be responsible for synchronizing fixed ALPR units (cameras) and mobile ALPR applications under its control. The ALPR Role shall also be responsible for logging all ALPR activities and events.

10. The Zone Manager Role shall be responsible for managing all software zones (collection of inputs) and logging associated zone events. Zones shall consist of inputs from both access control and video devices.
11. The Health Monitoring Role shall be responsible for monitoring and logging health events and warnings from the various client applications, roles, and services that are part of the USP. This role shall also be responsible for logging events within the Windows Event Log and for generating reports on health statistics and health history.
12. Optional Roles:
    a. The Federation Role shall be responsible for creating a large virtual system consisting of hundreds or thousands of independent and remote ACS, VMS, and/or ALPR systems. (Specifier, Enterprise only, additional license required)
    b. The Global Cardholder Synchronizer Role shall be responsible for synchronizing cardholder and credential data between the local site and a central site. Synchronization between remote sites shall also be supported. (Specifier, Enterprise only, additional license required)
    c. The Active Directory Role shall be responsible for synchronizing user accounts and cardholder accounts with a Microsoft Active Directory server. (Specifier, Professional and up, additional license required)
    d. The Intrusion Manager Role shall be responsible for managing third party intrusion devices such as alarm panels and perimeter detection devices. This role shall also be responsible for logging all intrusion events in a database. (Specifier, Standard, Professional and up, additional license required)
    e. The Asset Manager Role shall be responsible for integrating and synchronizing with third party asset management systems and logging asset related events. This role shall also be responsible for supporting the execution of asset-related reports such as inventory reports and asset activity reports. (Specifier, Professional and up, additional license required)
    f. The Plug-in Manager Role shall be responsible for the communication between the USP and third party systems such as video analytics, access control, ALPR, video, and building management systems. (Specifier, Professional and up, additional license required)
    g. The Point of Sale (POS) Manager Role shall be responsible for integrating the USP with third party POS systems and for logging transactions. (Specifier, Professional and up, additional license required)
    h. The Web SDK Role shall be responsible for connecting the USP to any application or interface developed with the Web Service SDK. Applications developed with the Web Service SDK shall be platform independent and rely on the REST protocol for communications. (Specifier, Professional and up, additional license required)
    i. The Communication Management Role shall be responsible for registering the SIP communication endpoints and for managing the call routing. (Specifier, all packages, additional license required)
    j. The Web Server Role shall be responsible for managing incoming Web Client connection and hosting the web pages for the Web Client. The Web Server Role acts as a proxy for the client connections and can be installed in a DMZ for additional security.
    k. The Media Gateway Role shall be responsible for connecting any video stream to a third party system using standard RTSP/RTSPS protocol. This role shall provide access to live and playback video. (Specifier, Professional and up, requires the SDK packages, additional license required)

K. Server Monitoring Service (Watchdog):
   1. The USP shall include a Server Monitoring Service that continuously monitors the state of the Server Software Module (SSM) service.
   2. The Server Monitoring Service shall be a Windows service that automatically launches at system startup, regardless of whether or not a user is logged into his account.
   3. The Server Monitoring Service shall be installed on all PCs/servers running an SSM. In the event of a malfunction or failure, the Server Monitoring Service shall restart the failed service. As a last resort, the Server Monitoring Service shall reboot the PC/server should it be unable to restart the service.

2.18 USP ACCESS CONTROL, VIDEO, AND ALPR UNIFICATION

A. The Monitoring UI shall present a true Unified Security Interface for live monitoring and reporting of the ACS, VMS, and ALPR. Advanced live video viewing and playback of archived video shall be available through the Monitoring UI.
B. The Configuration UI shall present a true Unified Security Interface for the configuration and management of the ACS, VMS, and ALPR.
C. The user shall be able to associate one or more video cameras to the following entity types: areas, doors, elevators, zones, alarms, intrusion panels, ALPR cameras, and more.
D. It shall be possible to view video associated to access control events when viewing a report.
E. It shall be possible to view video associated to intrusion panel events when viewing a report.
F. It shall be possible to view video associated to ALPR events when viewing a report.
G. The USP shall support the following Alarm Management functionality:
   1. Create and modify user-defined alarms. An unrestricted number of user-defined alarms shall be supported.
   2. Assign a time schedule or a coverage period to an alarm. An alarm shall be triggered only if it is a valid alarm for the current time period.
   3. Set the priority level of an alarm and its reactivation threshold.
   4. Define whether to display live or recorded video, still frames or a mix once the alarm is triggered.
   5. Provide the ability to display live and recorded video within the same video tile using picture-in-picture (PiP) mode.
   6. Provide the ability to group alarms by source and by type.
   7. Define the time period after which the alarm is automatically acknowledged.
   8. Define the recipients of an alarm. Alarm notifications shall be routed to one or more recipients. Recipients shall be assigned a priority level that prioritizes the order of reception of an alarm.
   9. Define the alarm broadcast mode. Alarm notifications shall be sent using either a sequential or an all-at-once broadcast mode.
   10. Define whether to display the source of the alarm, one or more entities, or an HTML page.
   11. Specify whether an incident report is mandatory during acknowledgment.
H. The workflows to create, modify, add instructions and procedures, and acknowledge an alarm shall be consistent for access control, ALPR, and video alarms.
I. Alarms shall be federated, allowing global alarm management across multiple independent USP, ACS, VMS, and ALPR systems.
J. The USP shall also support alarm notification to an email address or any device using the SMTP protocol.

K. The ability to create alarm-related instructions shall be supported through the display of one or more HTML pages following an alarm event. The HTML pages shall be user-defined and can be interlinked.
L. Alarm unpacking and packing shall be supported where all the entities associated to an alarm can be display in the Monitoring UI with the single click of a button.
M. The user shall have the ability to acknowledge alarms, create an incident upon alarm acknowledgement, and put an alarm to snooze.
N. The user shall be able to spontaneously trigger alarms based on something they see in the system.
O. An alarm shall be configured in such a way that it remains visible until the source condition has been acknowledged.
P. The user shall be able to investigate an alarm without acknowledging it.

2.19 USP THREAT LEVELS (SPECIFIER, ENTERPRISE ONLY, ADDITIONAL LICENSE REQUIRED)

A. The USP shall support Threat Levels to dynamically change the system behavior to respond to critical events.
B. Threat Levels shall be activated and deactivated by the CSA operator with the right privilege.
C. Threat Levels shall be set on an area or on the entire system.
D. Threat Levels shall affect the system behavior by executing any action available in the USP such as: trigger output, start recording, block camera, override recording quality, arm zone, set a door in maintenance mode, and more.
E. The following specific actions shall be available with Threat Level:
    1. Set minimum security clearance to restrict or permit access to cardholders on specific areas on top of the restrictions imposed by the access rules.
    2. Set minimum user level to automatically log out user from the USP.
    3. Set reader mode to change how the doors are accessed (for example card and PIN, or card or PIN).
F. A visible notification shall be displayed in all operator CSA when a Threat Level is activated.

2.20 USP REMOTE TASK

A. The USP shall provide, through a Remote Task, capabilities to remotely monitor and control the content of other workstations running the CSA (Monitoring UI) that are part of the same system.
B. The USP shall support video wall applications by connecting and controlling multiple workstations and monitors simultaneously.
C. The Remote Task shall be a graphical interface showing a replication of the remote workstation running the CSA (Monitoring UI).
D. The Remote Task shall allow the connection to other workstations using a low bandwidth mode to receive only snapshots of video viewed remotely.
E. The Remote Task shall allow the connection to other workstations using a spy mode to remain invisible to the remotely connected workstation. The spy mode option should be available to the user with permission to access the feature.
F. The functionality provided by the remote monitoring and control capability shall include:
    1. Remote monitoring and control of the monitoring and alarm monitoring tasks.
    2. Ability to remotely switch cameras, doors and zones into display tiles.

3. Ability to remotely control live and playback video.
4. Ability to remotely change the tile pattern.
5. Ability to remotely start/stop task cycling.
6. Ability to remotely go into full screen mode.
7. Ability to remotely save and reload the workspace.

2.21 USP ADVANCED TASK MANAGEMENT

A. USP shall support an infrastructure for managing Monitoring UI tasks used for live monitoring, day to day activities, and reporting.
B. Administrators shall be able to assign tasks and lock the operator's workspace. The user management of their workspace shall be limited by their assigned privileges.
C. Operators shall be able save their tasks as either Public tasks or Private tasks and in a specific partition. Public tasks shall be available to all users. Private tasks shall only be available to the owner of the task.
D. Operators shall be able to share their tasks by sending them to one or more online users. Recipients shall have the option to accept the sent task.
E. Operators shall be able to duplicate a task.

2.22 USP REPORTING

A. The USP shall support report generation (database reporting) for access control, ALPR, video, and intrusion.
B. Each and every report in the system shall be a USP task, each associated with its own privilege. A user shall have access to a specific report task if they have the appropriate privilege.
C. The workflows to create, modify, and run a report shall be consistent for access control, ALPR, and video reports.
D. Reports shall be federated, allowing global consolidated reporting across multiple independent USP, ACS, VMS, and ALPR systems.
E. Access control and ALPR reports shall support cardholder pictures and license plate pictures, respectively.
F. The USP shall support the following types of reports:
    1. Alarm reports
    2. Video-specific reports (archive, bookmark, motion, and more)
    3. Configuration reports (cardholders, credentials, units, access rules, readers/inputs/outputs, and more)
    4. Activity reports (cardholder, cardholder group, visitor, credential, door, unit, area, zone, elevator, and more)
    5. ALPR-specific reports (mobile ALPR playback, hits, plate reads, reads/hits per day, reads/hits per ALPR zone, and more)
    6. Health activity and health statistics reports
    7. Other types of reports, including visitor reports, audit trail reports, incident reports, and time and attendance reports
G. Generic Reports, Custom Reports, and Report Templates:
    1. The user shall the option of generating generic reports from an existing list, generating reports from a list of user-defined templates, or creating a new report or report template.
    2. The user shall be able to customize the predefined reports and save them as new report templates. There shall be no need for an external reporting tool to create custom reports

and report templates. Customization options shall include setting filters, report lengths, and timeout period. The user shall also be able to set which columns shall be visible in a report. The sorting of reported data shall be available by clicking on the appropriate column and selecting a sort order (ascending or descending).

3. All report templates shall be created within the Monitoring UI.
4. These templates can be used to generate reports on a schedule in PDF or Excel formats.
5. An unrestricted number of custom reports and templates shall be supported.

H. A reporting task layout shall consist of panes with settings (report length, filters, go and reset commands, etc.), the actual report data in column format, and a pane with display tiles. The user shall be able to drag and drop individual records in a report onto one or more display tiles to view a cardholder's picture ID, playback a video sequence, or an ALPR event.

I. The USP shall support comprehensive data filtering for most reports based on entity type, event type, event timestamp, custom fields, and more.

J. The reporting task shall have the ability to display results through graphics such as line charts, bar charts, stacked bar charts, doughnut charts, and pie charts.

K. The user shall be able to click on an entity within an existing report to generate additional reports from the Monitoring UI.

L. The USP shall support the following actions on a report: print report, export report to a PDF/Microsoft Excel/CSV file, export the graphics chart in JPG/PNG, and automatically email a report based on a schedule and a list of one or more recipients.

2.23 USP DASHBOARDS

A. The USP shall support the ability to create dashboards.

B. Operators shall be allowed to view dashboards if they are granted the appropriate privilege. Modification to dashboards should also be allowed to users granted the appropriate privilege.

C. Dashboards in the system shall be a USP task. A user shall have access to a specific dashboard task if they have the appropriate privilege.

D. Dashboards shall be saved either in a private folder or a public folder.

E. A dashboard shall consist of a canvas with carious widgets displayed on the canvas. All widgets should offer the ability to specify location and size to the widget, a title to the widget, a background color to the widget, and the ability to refresh periodically the content of the widget.

F. Dashboard widget types shall be:

1. Image: provides the ability to display an image (JPG, PNG, GIF, BMP) on a dashboard.
2. Text: provides the ability to display a text on a dashboard. The text style shall be configurable, so font, size, color, and alignment can be specified by the user.
3. Tile: provides the ability to display any entity of the USP inside of a tile.
4. Web page: provides the ability to display a URL on a dashboard.
5. Entity Count: provides the ability to display the total number of a specific entity type in the USP.
6. Reports: provides the ability to display the results of any saved reports in the system. The results shall be displayed either by showing the total number of results in the report, a set of top results from the report, or a visual graph from the data returned by the report.

G. It shall be possible to extend to the widgets of a dashboard using the SDK. This will provide the ability to develop custom widgets to the system.

H. The USP shall support the following actions on a dashboard: print dashboard, export dashboard to PNG file, and automatically email a report based on a schedule and a list of one or more recipients.

2.24 USP FEDERATION FEATURE: MONITORING OF REMOTE SYSTEMS (SPECIFIER, ENTERPRISE ONLY, ADDITIONAL LICENSE REQUIRED FOR EACH FEDERATED SITES AND ENTITIES)

A. The USP shall support the concept of a Federation feature for access control, video, and ALPR.
B. The Federation feature shall allow multiple independent USP systems (Federated systems) to be unified into a larger virtual system (the Federation feature). This shall facilitate the global monitoring of multiple independent USP systems.
C. The Federation feature shall support the unification of multiple independent video surveillance systems or VMS.
D. Entities that shall be federated and monitored centrally from the Federation feature shall include alarms, areas, cameras, cardholders and cardholder groups, credentials, doors, elevators, ALPR events, and zones (monitored inputs).
E. The Federation feature shall support a cloud-based deployment, whereby the service and infrastructure will be updated automatically and provisioned by the service provider, without need for on-site hardware.
F. The Federation feature shall support Global Alarm Management from the Monitoring UI for access control, video, and ALPR.
G. The Federation feature shall support Global Report Generation from the Monitoring UI for access control, video, and ALPR.
H. The Federation feature shall support dozens of operator actions on remote (federated) entities from the Monitoring UI (for example, generating a global report taking into account events from multiple independent sites or acknowledging remote alarms).

2.25 USP ZONE MANAGEMENT

A. The USP shall support the configuration and management of zones for input point monitoring via the Zone Manager Role. A user shall be able to add, delete, or modify a zone if they have the appropriate privileges.
B. A zone shall monitor the status of one or more inputs points. Zone monitoring or input point monitoring shall be possible through the use of a controller and one or more input modules. Inputs from video cameras or video encoders shall also be accessible via a zone.
C. Depending on the hardware installed, supervised inputs shall be supported. Depending on the input module used, both 3-state and 4-state supervision shall be available.
D. A schedule shall be defined for a zone, indicating when the zone will be monitored.
E. Custom Events shall provide full flexibility in creating custom events tailored to a zone. Users shall be able to associate custom events to state changes in monitored inputs.
F. The ACS shall support one or more cameras per zone. Video shall then be associated to zone state changes.
G. Input/Output (IO) Linking:
    1. Zone management shall support Input/Output (IO) Linking. I/O Linking shall allow one or more inputs to trigger one or more outputs.
    2. IO Linking shall be available in offline mode when communication between the server and hardware is not available.
    3. Custom Output Behaviors shall provide full flexibility in creating a variety of complex output signal patterns: simple pulses, periodic pulses, variable duty-cycle pulses, and state changes.

4. Through the “trigger an output” action, the ACS shall support the triggering of outputs with custom output behaviors.

2.26 USP USER AND USER GROUP SECURITY, PARTITIONS, AND PRIVILEGES MANAGEMENT

A. The USP shall support the configuration and management of users and user groups. A user shall be able to add, delete, or modify a user or user group if they have the appropriate privileges.
B. The USP shall support user authentication with claims-based authentication using external providers. External providers shall include:
   1. ADFS (Active Directory Federation Services)
   2. Azure Active Directory (through OpenID Connect)
   3. Ping Identity (through OpenID Connect)
   4. KeyCloak (through OpenID Connect)
   5. Other Open ID Connect / SAML2 authentication agents
C. Common access rights and privileges shared by multiple users shall be defined as User Groups. Individual group members shall inherit the rights and privileges from their parent user groups. User group nesting shall be allowed.
D. User privileges shall be extensive in the USP. All configurable entities for the USP, including access control, video, and ALPR shall have associated privileges.
E. Specific entities, such as cardholders, cardholder groups, and credentials shall include a more granular set of privileges, such as the right to access custom fields and change the activation or profile status of an entity.
F. Partitions:
   1. The USP shall limit what users can view in the configuration database via security partitions (database segments). The administrator, who has all rights and privileges, shall be allowed to segment a system into multiple security partitions.
   2. All entities that are part of the USP can be assigned to one or more partitions.
   3. A user who is given access to a specific partition shall only be able to view entities (components) within the partition to which they have been assigned. Access is given by assigning the user as an accepted user to view the entities that are members of a particular partition.
   4. A user or user group can be assigned administrator rights over the partition.
G. It shall be possible to specify user and user group privileges on a per partition basis.
H. Advanced logon options shall be available such as dual logon and more.
I. It shall be possible to specify an inactive period for the Monitoring UI after which time the application shall automatically lock, while still preserving access to currently displayed camera feeds.
J. It shall be possible to review user permissions and determine:
   1. For any entity in the system, which user group or user can view or modify it.
   2. For any user group or user in the system, what are its privileges.
   3. For any privilege in the system, which user group or user is allowed to perform the underlying action.

2.27 USP EVENT/ACTION MANAGEMENT

A. The USP shall support the configuration and management of events for video and ALPR. A user shall be able to add, delete, or modify an action tied to an event if he has the appropriate privileges.
B. The USP shall receive all incoming events from one or more ACS, VMS, and/or ALPR. The USP shall take the appropriate actions based on user-define event/action relationships.
C. The USP shall receive and log the following events:
    1. System-wide events
    2. Application events (clients and servers)
    3. Area, camera, door, elevator, and ALPR events (reads and hits)
    4. Unit events
    5. Zone events
    6. Alarm events
    7. ALPR events
    8. Health Monitoring events
D. The USP shall allow the creation of custom events.
E. The USP shall have the capability to execute an action in response to an access control, video, and ALPR event. The USP shall support the following list of actions, without being limited to:
    1. Add bookmark
    2. Arm intrusion detection area
    3. Arm zone
    4. Block and unblock video
    5. Bypass input
    6. Cancel postpone intrusion detection area arming
    7. Clear input bypass
    8. Clear task
    9. Display a camera on an analog monitor
    10. Display an entity in the CSA
    11. Email a report
    12. Email a snapshot
    13. Export report
    14. Forgives antipassback violation
    15. Go home
    16. Go to preset
    17. Import from file
    18. Override recording quality
    19. Override with event recording quality
    20. Override with manual recording quality
    21. Play a sound
    22. Postpone intrusion detection area arming
    23. Reboot unit
    24. Recording quality as standard configuration
    25. Rest area people count
    26. Reset parking zone inventory
    27. Run a macro

28. Run a pattern
29. Send a message
30. Send a task
31. Send an email
32. Set parking zone occupancy
33. Set reader mode
34. Set the door maintenance mode
35. Set threat level
36. Start/Stop applying video protection
37. Start/Stop recording
38. Start/Stop transfer
39. Temporary override elevator schedules
40. Trigger intrusion alarm
41. Trigger alarm
42. Trigger output
43. Trigger read
44. Unlock door explicitly

F. The USP shall allow a schedule to be associated with an action. The action shall be executed only if it is an appropriate action for the current time period.

2.28 USP SCHEDULES AND SCHEDULED TASKS

A. Schedules
   1. The USP shall support the configuration and management of complex schedules. A user shall be able to add, delete, or modify a schedule if they have the appropriate privileges.
   2. The USP shall provide full flexibility and granularity in creating a schedule. The user shall be able to define a schedule in 1-minute or 15-minute increments.
   3. Daily, weekly, ordinal, and specific schedules shall be supported.

B. Scheduled Tasks
   1. The USP shall support scheduled tasks for video, and ALPR.
   2. Scheduled tasks shall be executed on a user-defined schedule at a specific day and time. Recurring or periodic scheduled tasks shall also be supported.
   3. Scheduled tasks shall support all standard actions available within the USP, such as sending an email or emailing a report.

2.29 USP MACROS AND CUSTOM SCRIPTS

A. The USP shall enable users to automate and extend the functionalities of the system through the use of macros or custom scripts for access control, video, and ALPR.

B. Custom macros shall be created with the USP Software Development Kit (SDK).

C. A macro shall be executed either automatically or manually.

D. In the Monitoring UI, a macro shall be launched through hot actions.

2.30 USP DYNAMIC GRAPHICAL MAPS (DGM)

A. The USP shall support mapping functionality for access control, video surveillance, intrusion detection, ALPR, and external applications.

B. The USP shall provide a map centric interface with the ability to command and control all the USP capabilities from a full screen map interface.

C. It shall be possible to span the map over all screens of the USP client station. In the scenario where the map is spanned over all the screens of the USP client station it shall be possible to navigate the map including pan and zoom, and the map's moves shall be synchronized between all screens. Spanning the map over multiple screens must provide the same command and control capabilities than in a single screen display.

D. The DGM shall support the following file format and protocol for importing map background:
   1. PDF
   2. JPG
   3. PNG
   4. Web Tile Map Service (WTMS) and Web Map Service (WMS) defined by the Open Geospatial Consortium (OGC)
   5. BeNomad
   6. AutoCAD (DWG & DXF)

E. The DGM shall provide the following online map providers for use as map background and provide the ability to manage their service license if they require one:
   1. Google Map, aerial, terrain (Licensed)
   2. Bing Map, aerial, satellite, hybrid (Licensed)
   3. ESRI ArcGIS (Licensed)
   4. OpenStreet Map aerial (Licensed)
   5. OVI hybrid

F. It shall be possible to configure a mixed set of maps made of GIS, online providers, and private imported files and link them together.

G. The DGM shall provide the ability to display all native entities of the USP including:
   1. Cameras, fix, and PTZ
   2. Doors
   3. Camera sequences
   4. Areas
   5. Intrusion areas
   6. Intrusion zones
   7. License Plate Recognition cameras
   8. Digital inputs
   9. Digital outputs
   10. Intercoms
   11. Alarms
   12. Macros
   13. Police Car Patrollers

H. The DGM shall provide the ability to draw and display information over the map in the form of:
   1. Vectoral shapes: lines, rectangles, polygons, ellipse
   2. Pictures
   3. Text

I. The DGM shall provide the ability to display any type of third party entities integrated through an SDK. (Specifier, Plan Manager Standard and up, additional license required)

J. The DGM shall provide the ability to display layer of information in Keyhole Markup Language (KML) format.
K. The DGM shall provide the ability to the operator to manage layers of entities displayed over the map, being able to turn them on and off and changing the superposition order.
L. The DGM shall provide the ability to import data layers from one or more ESRI ArcGIS servers.
M. The DGM shall provide the operators with the ability to manage layers that are imported from ESRI ArcGIS. The operators shall be able to turn the layers on and off, as well as sort the layers.
N. The DGM shall offer built-in map data backup and restore for both map background and layers of entities.
O. The DGM shall provide the ability to import configuration from an eternal file such as:
    1. AutoCAD layer for objects
    2. CSV, Excel file
P. The DGM shall offer failover capabilities.
Q. The DGM shall scale up to several thousands of entities on a single map and hundreds of maps.
R. The DGM shall provide a means to update a map background without affecting the map object configuration.
S. The DGM shall offer a user-friendly graphical map designer to configure the maps.
T. The DGM shall provide a user friendly and intuitive navigation that includes:
    1. The ability to create hierarchies of maps to facilitate navigation within and between various sites and buildings.
    2. The ability to define favorites for recurrent position recall.
    3. The possibility to create links between maps. The map links shall allow the link from one map to multiple maps representing the floors of a building. Navigating between floors of a building shall keep the zoom level of the map.
    4. A common user experience regarding navigation into the map for both GIS and private maps. (Specifier, Plan Manager Advanced required for GIS)
U. It shall be possible to monitor the state of entities on the map. It shall be possible to customize the icons of any entities represented on the map.
V. The DGM shall offer the ability to optionally set a graphical display notification of the motion detection.
W. The DGM shall offer a smart selection too to access the video. By clicking the location the user wants to see, the DGM will automatically select the cameras that can see this location and move the PTZ towards that location. This smart selection too shall take obstacles into consideration and not display cameras that cannot see the location because of a wall.
X. It shall be possible to select a location by drawing a zone of interest on the DGM, and to display all the entities that are part of that zone or interest at once.
Y. The user shall be able to select and display the content of multiple USP entities on the map in pop-up windows.
Z. The user shall be able to move, resize, and pain the USP entity pop-up windows to the map.
AA. It shall be possible to access live and playback video from the map.
BB. It shall be possible to monitor all entity event notifications from the DGM. Users shall be able to turn notifications on and off per entity.
CC. The DGM shall offer the ability to fully operate alarm monitoring. It shall be possible to:
    1. Center the map on entities related to the alarm.

2. Visualize the Alarm notifications on the map and access the related videos from the map.
3. Trigger and receive alarms.
4. Act on the alarm from the DGM, including acknowledgements, forwarding, and investigation.
5. Visualize that an alarm occurred in an underlying linked map.

DD. The DGM shall provide the following search capabilities:
1. Search and center by entity name.
2. From the Display of an entity in the USP, locate the entity on the map and offer the ability to select another one close-by.
3. By street address, city, landmark, point of interest (using geocoder license from Google, ESRI, or other provider)

EE. Any update of map content by an administrator shall be immediately and dynamically pushed to all DGM users.

FF. The DGM shall support the use of GIS maps, private maps, or a combination of both for the map background. (Specifier, Plan Manager Advanced required for GIS).

GG. The DGM shall be compatible with any GIS compliant maps with the OGC and supporting WMTS and WMS. This includes, but is not limited to, ESRI maps. The DGM shall allow the selection of the appropriate GIS layers. (Specifier, Plan Manager Advanced required for GIS).

HH. The DGM shall provide an intuitive built-in map designer for entity positioning on the map using drag and drop. Any configuration shall be graphic.

II. It shall be possible to edit and configure multiple map objects at once.

JJ. All map design modifications shall be logged in an audit trail.

KK. Various actions shall be available within maps for execution through simple and intuitive double-click, right-click, or drag-and-drop functionality. Examples of actions available through maps shall include unlocking a door and acknowledging an alarm.

LL. Through the following functionalities, the DGM shall allow the management of USP alarms from the map (Specifier, Plan Manager Standard and up, additional license required):
1. Locate on the map entities related to the alarm.
2. Display entities of the alarm with a specific icon, color, transparency level, and blinking rate.
3. List, select, and locate alarms.
4. Auto center the map on the highest priority alarm.
5. Handle the alarm from the map, including acknowledgement, forwarding, and investigation.
6. All map containers, such as hotspots or map links, shall reflect the alarm status of the contained entities.

MM. It shall be possible to add advanced functionality to map objects using the SDK. Any functionality available through the USP SDK shall be available within maps. (Specifier, Plan Manager Standard and up, additional license required)

NN. The DGM shall offer lasso tools for:
1. Displaying entities at one location through a single action.
2. Triggering an action on all entities at one location in a single click.
3. Editing multiple entities at one location simultaneously.

OO. The DGM shall allow the display of USP entities selected from the map on a remote monitor (video wall). (Specifier, Plan Manager Standard and up, additional license required).

PP. The DGM shall provide the ability to search within the map by entity name.

QQ. The DGM shall allow the use of KML overlay map information for both GIS and private maps. Moveable objects shall be supported using the KML. (Specifier, Plan Manager Advanced only, additional license required)

RR. The Contractor shall provide licenses for each entity that is required to be shown on the graphical maps. (Specifier, licenses are sold in packs based on quantity of entities, specify a site license or unlimited after 1,000 entities)

2.31 USP DIGITAL EVIDENCE MANAGEMENT SYSTEM (DEMS) (SPECIFIER, GENETEC CLEARANCE, SEPARATE SUBSCRIPTION REQUIRED)

A. The USP shall support the ability to electronically share video exports with third parties.
B. The USP shall allow recipients to natively review exported video from a web browser, without the need to install software or browser plugins.
C. Video exported from the UPS will include the original file and timestamp information, as well as the system, workstation, and camera source metadata that can be viewed from the DEMS.
D. The USP shall support the ability to create a case within the DEMS, and assign associated incident details, when exporting video.

2.32 USP AUDIT AND USER ACTIVITY TRAILS (LOGS)

A. The USP shall support the generation of audit trails. Audit trails shall consist of logs of operator/administrator additions, deletions, and modifications.
B. Audit trails shall be generated as reports. They shall be able to track changes made within specific time periods. Querying on specific users, changes, affected entities, and time periods shall also be possible.
C. For entity configuration changes, the audit trail report shall include detailed information of the value before and after the changes.
D. The USP shall support the generation of user activity trails. User activity trails shall consist of logs of operator activity on the USP such as login, camera viewed, ALPR event viewed, badge printing, video export, and more.
E. The ACS shall support the following actions on an audit and activity trail report: print report and export report to a PDF/ Microsoft Excel/CSV file.

2.33 USP INCIDENT REPORTS

A. Incident reports shall allow the security operator to create reports on incidents that occurred during a shift. Both video-related and access control-related incident reports shall be supported.
B. The operator shall be able to create standalone incident reports or incident reports tied to alarms.
C. The operator shall be able to link multiple video sequences to an incident, access them in an incident report, and change the date or time of the sequences later on.
D. It shall be possible to create a list of Incident categories, tag a category to an incident, and filter the search with the category as a parameter.
E. Incident reports shall allow the creation of a custom form on which to input information on an incident.
F. Incident reports shall allow entities, events, and alarms to be added to support at the report's conclusions.

2.34 USP DATA INGESTION

A. The USP Shall allow the possibility to import external data from outside sources to enhance unification of data sources within the USP.
B. Each data source shall be defined by a set of fields and field types that describe the data source. Field types shall be:
    1. String
    2. 32 bit & 64 bit integer
    3. Floating point number
    4. Boolean
    5. Timestamp
    6. Binary (in a file or base 64)
C. The visualization of each data point from a data source shall be configurable to determine what fields from the data should be displayed. The configuration of each field shall be:
    1. Which fields are displayed or hidden
    2. What order are the fields displayed
    3. A label to specify the name of the field (to have a key:value format)
    4. An option to specify how to display the field (text value, Image, clipboard value, hyperlink to a web page, hyperlink to an entity in the system, sound file)
D. A privilege should be available for each data source to allow / deny access to specific user & user groups of the USP.
E. Ingested data shall be available in the USP reporting system.
F. Ingested data shall be available to display in the USP Dashboards.

2.35 USP THIRD PARTY INTEGRATION

A. Microsoft Active Directory Integration (Specifier, Professional and up, additional license required)
    1. The USP shall support a direct connection to one or multiple Microsoft Active Directory server via the Active Directory Role(s). Active Directory integration shall enable the synchronization of information from the Active Directory server to the USP.
    2. Active Directory integration shall permit the central management of the USP users, user groups, cardholders, and cardholder groups.
    3. The USP shall be able to connect to and synchronize data from multiple Active Directory servers (up to 10).
    4. The USP shall support synchronizing Active Directory Universal Groups as well as security groups belonging to other domains within the same forest.
    5. The USP shall support Microsoft Active Directory encryption using LDAP SSL.
    6. When enabled, Active Directory shall manage user logon to the USP client applications through the user's Windows credentials. Logging on to the USP shall utilize native Active Directory password management and authentication features.
    7. It shall be possible to synchronize the following USP entities and their information from Active Directory with the USP:
        a. Users (username, first and last names, email address, and more)
        b. User groups (user group name, description, and group email address)
        c. Active Directory attributes to USP custom fields

8. When enabled, the addition, removal, or suspension of a user's Windows account in Active Directory shall result in the creation, deletion, or disabling of the equivalent user account in the USP.
9. Supported synchronization methods for additions, modification, and deletions of synchronized entities shall include on first logon (users only), manual synchronization, and scheduled synchronization.
10. The USP shall support user connections across independent organizations by connecting to an identity provider using claims-based authentication such as ADFS (Active Directory Federation Services), Azure Active Directory, other OpenID Connect & SAML2 providers.

B. Intrusion Detection Integration: (Specifier, Standard, Professional and up, additional license required - for an extended list, refer to the Supported Plugins in Security Center document)
1. The USP shall integrate with third party intrusion panels and devices via an Intrusion SDK. The Intrusion Manager Role shall manage communications with the intrusion panels. Communications with intrusion devices shall be over serial communications and/or an IP network.
2. Integration with intrusion panels shall be possible outside the release cycle of the USP. It shall be possible to add new integrations at any point in time.
3. Functionality available via the integration of intrusion devices with the USP shall include the following (where supported by the intrusion panel):
    a. Arm and disarm intrusion devices (manually, on schedule, or following a USP event).
    b. Activate or trigger intrusion device outputs.
    c. View intrusion events and alarms.
    d. Monitor the status, including arming status, of the intrusion devices.
    e. Video verification of intrusion events and alarms with video panels.
    f. Create USP zones using intrusion device inputs.
4. Currently supported intrusion panels include:
    a. Bosch G Series panels
    b. DSC Power Series panels
    c. DMP XR Series panels
    d. Honeywell Galaxy Dimension and Flex panels
    e. Vanderbilt SPC
    f. UTC Advisor Master and Advanced
    g. Bosch Map 5000
5. Additional intrusion devices supported:
    a. Buytime
    b. Alarm Panel Receiver
    c. Southwest Microwave RPMII

C. Third Party Access Control Systems: (Specifier, Professional and up, additional license required, for extended list please refer to the Security Center supported Plugins guide)
1. The USP shall integrate with third party access control software via the SDK. Communications with access control software shall be over an IP network, and should not support administrative tasks such as cardholder management.
2. Integration with access control software shall be possible outside the release cycle of the USP. It shall be possible to add new integrations at any point in time.

3. Functionality available via the integration of access control software with the USP shall include the following (where supported by the access control solution):
    a. Synchronize access control entities and receive associated events and states within the USP, including:
        1) Cardholders and access rights
        2) Visitors
        3) Readers and doors
        4) Alarms
        5) Inputs and outputs
    b. Monitor access control events.
    c. Monitor and Acknowledge access control alarms.
    d. Trigger actions and outputs in the access control software using hot actions and event-to-actions.
    e. Lock and unlock doors in the access control software.
    f. Video verification of access control events and alarms.
    g. Configure event-to-actions using the access control events and alarms.
    h. Generate Security Center reports using from the in the access control data.
    i. View and monitor states of door entities in the USP maps.
4. Currently supported access control manufacturers include:
    a. Tyco Softwarehouse CCURE
    b. UTC Lenel Onguard
    c. Amag Symmetry
    d. Siemens Sipass
    e. AssaAbloy ARX

D. Third Party Destination Dispatch Systems: (Specifier, Professional and up, additional license required, for extended list please refer to the Security Center supported Plugins guide)
1. The USP shall integrate with third part destination dispatch (elevator control0 software via the SDK. Communications with the destination dispatch software shall be over an IP network.
2. Integration with destination dispatch software shall be possible outside the release cycle of the USP. It shall be possible to add new integrations at any point in time.
3. Functionality available via the integration of destination dispatch software with the USP shall include the following (where supported by the destination dispatch solution):
    a. Destination dispatch entity creation and reception of associated events and states within the USP, including:
        1) Floors and landings
        2) Elevator cars (front/rear doors) and kiosks
        3) Cardholders and credentials (if applicable)
    b. Monitor destination dispatch events.
    c. Trigger manual dispatch actions.
    d. Video verification of destination dispatch events.
    e. Configure event-to-actions using the destination dispatch events.
    f. Generate Security Center reports using the destination dispatch data.
    g. Support multiple readers

1) Kiosk internal readers
2) USP readers

h. Kiosk advanced modes and passenger types.

4. Currently supported destination dispatch manufacturers include:
   a. Otis Compass
   b. Thyssenkrupp
   c. Schindler
   d. MCE

E. Asset Management Integration: (Specifier, Professional and up, additional license required)
   1. The USP shall integrate with third party asset management systems via the Asset Management Role.
   2. Communications with asset management solutions shall be over an IP network (via software communications).
   3. Functionality available via the integration of asset management systems with the USP shall include the following (where supported by the asset management systems):
      a. Synchronize asset management system assets with USP asset entities.
      b. Live monitoring of asset-related activity events, health events, and activity (asset online, asset offline, asset moves, or low battery).
      c. Synchronization of asset management alarms with Security Center alarms.
      d. Viewing video tied to asset-related activity and alerts within monitoring and reporting tasks.
      e. Acknowledging alarms in Security Center which acknowledges alerts in the asset management system and vice versa.
      f. Real-time tracking of asset locations on a per area basis.
      g. Asset Management Inventory reporting task that details the current location (area) of an asset.
      h. Asset Activity reporting task that provides a historical review of asset-related events and activity.
   4. Currently supported asset management systems include:
      a. Deister Key management
      b. Morsewatchmans
      c. TRAKA

F. Additional Third Party Integrations:
   1. The USP shall support multiple approaches to integrating third party systems. These shall include: Software Development Kits (SDKs), REST-based Web Service SDKs, RTSP Service SDKs, and more. (Specifier, Professional and up, SDK package and license required)
   2. The USP architecture shall support the addition of new connectors to integrate to third party system integration, such as: (Specifier, refer to the website for how these are licensed, for an updated list of available third party integration, please refer to the supported plugin guide)
      a. Video analytics
      b. Third party video systems
      c. Third party access control systems
      d. ALPR integrations with pay stations, permit vendors, pay-by-phone vendors, and ticketing vendors

e. Building management systems
f. Access Control ecosystem (such as ID scanner, card synchronization, Guardtour, Morpho Biometrics)
g. Transaction monitoring (POS, Barcode scanning, ATM)
h. Industrial IoT (Modbus, BACnet, OPC, SNMP)
i. Industrial Protocol Interface (BACnet, Modbus)
j. Videowall (Barco, Eizo)
k. Human resource management systems (HRMS)
l. Autonomous Drone Integration
m. Intelligent Keys (Salto SVN, Medeco XT, CLIQ)
n. Dynamic Logbook
o. Facial Recognition Framework
p. Real-time Location Services - RTLS (HID)

2.36 USP SOFTWARE DEVELOPMENT KIT (SDK)

A. A USP SDK shall be available to support custom development for the platform.
B. The SDK shall include functionalities specific to the embedded automatic license plate recognition (ALPR), access control (ACS), and video (VMS) systems.
C. Integration with external applications and databases shall be possible with the SDK.
D. The SDK shall enable end-users to develop new functionality (user interface, standalone applications or services) to link the USP to third party business systems and applications, such as Badging Systems, Human Resources Management Systems (HRMS), and Enterprise Resource Planning (ERP) systems.
E. The SDK shall be based on the .NET framework.
F. The SDK shall support dynamic or transactional updates to the USP configuration. It shall also support change notification of USP entity configuration.
G. The SDK shall provide an extensive list of programming functions to view and/or configure core entities such as: users and user groups, alarms, custom events, and schedules, and more.
H. The SDK shall provide an extensive list of programming functions to view and configure ACS, VMS, and ALPR.
I. The SDK shall provide an extensive list of programming functions to view and configure most ACS entities such as: cardholders, cardholder groups, visitors, credentials, access rules (modify only), and custom fields.
J. The SDK shall be able to receive real time events from the following USP entities: users and user groups, areas, zones, cameras, video units, doors, door controllers (units), elevators, cardholders, cardholder groups, and credentials.
K. The SDK shall be able to query the history of events for areas, cameras, zones, alarms, cardholders, credentials, visitors, doors, query license plate read events, license plate hit events, generate a license plate hits report, generate a license plate reads report.
L. The SDK shall support the following alarm functions: view alarms in real time, acknowledge alarms, change priority, and change recipient.

2.37 NETWORK SWITCH

A. Cisco Catalyst 9200 Series PoE+ Switches
B. Rack mountable
C. Number of ports based upon drawings plus 20% spare capacity for future

D. Fiber backbone
E. 20 minute UPS back-up
F. Configure as required

2.38 PARTIAL BILL OF MATERIAL (EACH SCHOOL)

A. UPS
    1. Entire system (excluding remotely located video monitors) shall include UPS back-up sized for 20 minutes
B. Network Switches - Number as required plus 20% spare ports
    1. Rack mounted
C. Video Cameras - Type and location as shown on the drawings.
    1. Include all mounting hardware etc.
D. Licensing (See Drawings for quantities):
    1. GSC-OM-P: Qty 1
    2. GSC-OM-P-1C: Number of cameras plus 5 spare
    3. ADV-CAM-P-1Y: Number of cameras plus 5 spare
    4. GSC-1U: qty 5 (Additional User Connections—Concurrent)
    5. GSC-THREATLEVELS: Qty 1 (Threat Levels for Lockdowns)
    6. GSC-1U : Qty 5 (User Clients)
    7. GSC-Mobile-1U: Qty 10 (Mobile Clients)
    8. GSC-PM-Advanced: qty 1 (Mapping Software)
    9. GSC-PM-STD-250: qty 1 (Mapping Software)
E. Archivers/Servers:
    1. *(Part numbers subject to change—Check with Genetec for most up to date PN)
    2. SV-2020E-R14-72T-12-210: 72TB StreamVault Archiver (based upon a 69 camera system, scale per number of cameras for each school)
    3. SV-2020E-R6S-D480-236: Directory Server
F. Base Bid:
    1. Cary School District 26 Video Surveillance System will be based on Genetec Security Center 5.xx, with an on-premises deployment. BOM above is based upon this sytem.

PART 3 EXECUTION

3.01 INSTALLATION REQUIREMENTS

A. Install system per the manufacturer's instructions.
B. Coordinate the operational compatibility of all locking devices not supplied by the Access Control manufacturer with the Access Control manufacturer.
C. If required by the Access Control and Video Camera and monitirong manufacturer, the locking devices supplier shall include electronic suppression and be rated for continuous duty operation.
D. All locking device wiring shall be run separate from all other system wiring except wire specifically permitted by the Access Control supplier.

3.02 PATHWAYS

A. Install with the following minimum clearances:

1. 48 inches from motors, generators, frequency converters, transformers, x-ray equipment, and uninterruptible power systems.
2. 12 inches from power conduits and cables and panelboards.
3. 5 inches from fluorescent and high frequency lighting fixtures.
4. 6 inches from flues, hot water pipes, and steam pipes.

B. Conduit:
1. Do not install more than 2 (two) 90 degree bends in a single horizontal cable run.
2. Leave pull cords in place where cables are not initially installed.
3. Conceal conduit under floor slabs and within finished walls, ceilings, and floors except where specifically indicated to be exposed.
   a. Conduit may remain exposed to view in mechanical rooms, electrical rooms, and telecommunications rooms.
   b. Treat conduit in crawl spaces and under floor slabs as if exposed to view.
   c. Where exposed to view, install parallel with or at right angles to ceilings, walls, and structural members.
   d. Under floor slabs, locate conduit at 12 inches, minimum, below vapor retarder; seal penetrations of vapor retarder around conduit.

C. Grounding and Bonding: Perform in accordance with TIA J-STD-607 and NFPA 70.

D. Firestopping: Seal openings around pathway penetrations through fire-rated walls, partitions, floors, and ceilings.

E. Cable Routing
1. All cabling to re routed within approved raceway or above lay-in ceiling. Cabling shall be hidden by ceiling or raceway in all locations of the building with the exception of IDF and MDF rooms or as otherwise noted on the drawings.
   a. Where cable tray is provided, route cabling within cable tray.
   b. Where conduit sleeve is provided, route cabling within conduit sleeve
   c. Above lay-in ceilings, where cable tray or conduit sleeves are not available:
      1) Where raceway for cabling is not provided, Contractor shall run cabling through 2" J hooks.
      2) J hooks shall be directly attached to building structure at a maximum of 4'-0" center-to-center.
      3) Additional J hooks will be added as necessary to limit the maximum cable catenary (cable sag) to 12" maximum.
      4) Install tye-wraps around all J hooks upon completion of cable pulls.
      5) J hook cable density shall not exceed 60% of the maximum cable count suggested by manufacture. If necessary, provide additional level of J hooks for high cable density runs.
      6) Contractor shall provide all mounting hardware (threaded rod, unistrut, etc.) Necessary to solidly mounted, complete cable raceway system.

3.03 TESTING AND COMMISSIONING

A. The installing contractor and manufacture's representatives shall be responsible for final system hardware hook-up and checkout prior to commissioning the system to the end-user.

B. System shall be fully configured with the owner's participation and input. All decisions regarding system configuration shall be subject to owner review. All changes requested by owner shall be implemented before substational completion.

C. Contractor shall return to the site six months post system acceptacent to retest and commision the system. Contractor shall coordinate operation with owner and make requested changes to the software and hardware opearation.

3.04 TRAINING AND INSTRUCTION

A. Before the system is turned over to the Owner, the manufacturer shall provide 2 days of system operations training for 4 hours each day. Presentation at school shall include up to 10 of the Owners representatives meeting a minimum expected level of computer competence.

B. This training shall be conducted during normal business hours of the equipment supplier at a date and time of mutual convenience.

C. This training shall be conducted by a dedicated trainer employed full-time for the purpose by the manufacturer of the access control system. Representatives of a local dealer operation shall not be considered acceptable.

D. Training as described above shall be repeated two months after initial training. At that time, contractor shall re-program, re-configure and or re-position system software and/or hardware per owner's requested changes.

3.05 GUARANTEE

A. The electrical Contractor shall guarantee all wiring, hardware, and computer sofware to be free from inherent and mechanical defects due to workmanship and materials used for a period of two (2) years from date of final acceptance.

B. The systems integrator, and not distributor or electrical Contractor, shall furnish in writing a two (2) year warranty. Warranty shall list all equipment in the system and state that equipment to be free from inherent and mechanical defects due to workmanship and materials for a period of two (2) years from date of start up and beneficial use of the system.

C. Warranty service for the equipment shall be provided by the system supplier's factory trained representative.

D. The guarantee will cover entire systems (electronic components, wiring, software, peripheral devices, etc.). The guarantee will be structured such that any system malfunction during the first year from system initial acceptance will be completely repaired within a reasonable period at no additional cost in money or labor. In addition, this guarantee shall cover one annual cleaning and servicing of all equipment. At a minimum, the system servicing shall occur twice during the period of this contract: end of 1st year and end of 2nd year. Service shall include a complete functional test and cleaning of all devices.

E. Software updates shall be included for a minimum of two years. At a minimum, integrator shall complete software updates and certifiy the proper opeartion of update at the end of year 1 and year 2.

3.06 MANUFACTURER'S WARRANTY

A. Manufacturer shall include warranty for 5 yhears and include advantage support service which shall include the follwoing additional services over the standard warranty:

B. Access to phone support and online chat for technical assistance

C. Online case management

D. Online system availability monitor

E. Access to Major and Minor Release Upgrades

3.07 DEPLOYMENT SERVICES AND SYSTEM COMMISSIONING

A. General Requirements:
   1. The contractor shall engage the services of the USP vendor to assist in the management of the deployment of the USP at the end-user site on projects that involve:
      a. Multiple contractors or subcontractors that will be responsible for deploying the USP at multiple client sites in different geographical regions.
      b. Complex enterprise installations involving advanced functionality (for example The Federation feature, failover, plugins) and/or multiple systems (for example access control, video, ALPR) and/or third party integrations.
      c. Extensive use of customized solutions/plugins developed by the vendor that will be integrated into the USP.
   2. The USP vendor services shall include Deployment Management and System Configuration and Commissioning.

B. Deployment Management Service:
   1. The Deployment Management service from the vendor shall include a Project Manager acting as the single point of contact for all communications between the contractor and the vendor organization and who will be responsible for:
      a. Conducting a Risk Assessment of the impact of potential risk factors on the operation of the vendor's USP.
      b. Providing a project plan for the deployment of the vendor's USP.
      c. Managing the development and deployment of the custom solution components that will be integrated into the vendor's USP (if applicable).
      d. Providing a scope of work detailing the services to be provided by the vendor to assist in the deployment of the vendor’s USP.
      e. Coordinating and scheduling the vendor field services with the contractor to assist with the deployment of the vendor’s USP.
      f. Providing regular project status updates to the contractor regarding the development of custom solutions (if applicable) and the deployment of the vendor’s USP.

C. Solution Architect Service:
   1. The Solution Architect service from the vendor shall include a Solutions Architect Engineer acting as a single technical point of contact throughout the deployment of the USP, and who will be responsible for:
      a. Assisting the contractor/subcontractor with the design and architecture of the vendor’s USP.
      b. Conducting technical consultation activities that may include fit/gap analysis, system design reviews, device compatibility assessments, functional and technical design reviews as well as performance reviews of the vendor’s USP.
      c. Conducting a system assessment and ensuring best practices of the vendor’s USP are followed.
      d. Providing upgrade and migration strategy for the vendor’s USP where applicable.
      e. Providing documentation regarding the system architecture, system design, hardware specifications and compatibility requirements, camera bandwidth calculations, and best practices as they relate to the vendor’s USP.

D. System Configuration and Commissioning Service:
   1. The System Configuration and Commissioning service from the vendor shall include a Field Engineer who will be responsible for:

a. Assisting the contractor’s or subcontractor’s onsite/remote technicians with the configuration and commissioning of the vendor’s USP at the client site.
b. Conducting a test of the USP following the deployment of the system using real-world operator scenarios to ensure optimal system performance.
c. Providing the contractor with a Service Report detailing the tasks completed during the deployment of the USP at the client site, as well as any recommendations for improving the performance of the USP that must be implemented by the contractor.
d. Providing a knowledge transfer of the vendor's USP to the contractor following the deployment of the USP at the client site.

END OF SECTION

SECTION 283100 - NEW FIRE ALARM AND MASS NOTIFICATION SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire alarm and mass notification panels.
B. Local Operators Console
C. Mass Notification speakers and combination devices
D. Manual fire alarm stations.
E. Automatic smoke and heat detectors.
F. Fire alarm signaling appliances.
G. Auxiliary fire alarm equipment.

1.02 RELATED SECTIONS

A. Section 260553 - Identification for Electrical Systems
B. Section 260519 - Low-Voltage Electrical Power Conductors and Cables (600 V and Less).
C. Section 260534 - Conduit.
D. Section 260535 - Surface Raceways
E. Section 260537 - Boxes.

1.03 REFERENCES

A. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
B. NFPA 72 - National Fire Alarm and Signaling Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
C. UL 2572 - Standard for Safety Mass Notifcaton Systems latest edition
D. IAC 180 - Illinois Administrative Code 180.
E. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures; National Fire Protection Association; 1997.
F. National Fire Protection Association (NFPA) - USA:
    1. No. 12 - High Pressure CO2 Extinguishing Systems
    2. No. 12B - Halon 1211 Extinguishing Systems
    3. No. 13 - Sprinkler Systems
    4. No. 13A - Halon 1301 Extinguishing Systems
    5. No. 15 - Water Spray Systems
    6. No. 16 - Foam/Water Deluge and Spray Systems
    7. No. 17 - Dry Chemical Extinguishing Systems
    8. No. 17A - Wet Chemical Extinguishing Systems
    9. No. 72 - National Fire Alarm Code
    10. No. 90A - NFPA
    11. No. 101 - Life Safety Code
G. Underwriters Laboratories Inc. (UL) - USA:
    1. No. 268 - Smoke Detectors for Fire Protective Signaling Systems

2. No. 864 - Control Units for Fire Protective Signaling Systems
3. No. 268A - Smoke Detectors for Duct Applications
4. No. 521 - Heat Detectors for Fire Protective
5. No. 464 - Audible Signaling Appliances
6. No. 38 - Manually Actuated Signaling Boxes
7. No. 346 - Waterflow Indicators for Fire Protective Signaling Systems
8. No. 1076 - Control Units for Burglar Alarm Proprietary Protective Signaling Systems
9. No. 1971 - Visual Notification Appliances

H. Local and State Building Codes

I. All requirements of the Authority Having Jurisdiction (AHJ).

1.04 SUMMARY

A. A new complete fire alarm and mass notification system which complies with this section shall be provided and installed. Provide and install all equipment as necessary.
   1. System shall include interface to building phone switch. Phone switch interface shall allow voice commands from password enabled phone network to grab mass notificaiton network. Coordinate phone switch modifications and programming with owner's phone system contractor. Wiring to phone switch included within the contract. Final termination and phone switch modifications by owner.
   2. System shall include 4 warning buttons and programmed voice messages. Each button shall be unique color with custom lettering. Colors and lettering to be determined.
   3. System shall support continuous power rated amplifiers to all audio circuits.

B. The building shall only be allowed to be unprotected by a fire alarm system during working hours while the new system is being installed. At the end of each work day, all areas of the building shall be protected by the existing and/or new fire alarm system. It is acceptable to have the existing system trigger the new system during construction for purposes of central authority notificaiton.

C. This Section includes fire alarm systems, including manual stations, detectors, notification appliances, speakers, signal equipment, controls, and devices.

D. Work covered by this specification section includes the furnishing of labor, equipment, materials, and complete operational performance required for installation of the Fire Alarm System as shown on the drawings, as specified, and as directed by the Architect/Engineer.

E. The work covered by this section of the specification is to be coordinated with the related work as specified elsewhere under the project specifications.

F. The Fire Alarm System shall consist of all necessary hardware equipment and software programming to perform the following functions:
   1. Fire Alarm and Detection Operations
   2. Remote Manual and Automatic Control of Elevators, all Smoke Control Related Fan System, Door Hold-open devices, Fire Suppression Appliances, Remote Monitoring of Sprinkler, Fire Pump and Emergency Power Systems, and/or Off Premise Notification.

G. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Division 15 Section "Fire Protection" for water-flow, pressure, or tamper switches connected to fire alarm system.
   2. Division 15 Section "Pneumatic Control Systems" for duct smoke detectors.
   3. Division 15 Section "Electric Control Systems" for duct smoke detectors.
   4. Division 16 Section "Intrusion Detection Systems" for Security monitoring.

1.05 SYSTEM DESCRPTION

A. The System supplied under this specification shall be UL864 - 10th Edition Listed fire detection, 100 Channel network one-way and two-way voice communication system utilizing IPv6 communications format for peer-to-peer network communication operations. Which allows node to node, or node to annunciator, communication to occur across a single pair of wires or single fiber optic cable strand. The network shall consist of a main node Central Control Station (CCS) multiple remote control panel nodes Autonomous Control Unit/Remote Control Panels (ACU/RCP) and nodes operating as Local Operator Consoles (LOCs)/annunciators. Each node shall display all system network points and full command & control functions on color LCD touch screen display. No master slave arrangement is allowed.

B. Specify the project scope networking requirements; Class X

C. System enhance survivability, the network shall be MESH type communications allowing for multiple Class X/A/B rings within the system. Each node shall be an equal, active functional member of the network, capable of making all local decisions, local pre-recorded voice message storage and initiating network tasks for other nodes. In the event of a node failure or communications failure between nodes, nodes shall be capable of forming sub-networks and remain operational between communicating nodes with all pre-recorded voice messages announcements. No central storage of pre-recorded voice messages will be acceptable.

D. All lobby cabinet enclosure(s) and annunciator/LOC(s) shall be Bronze; Pantone Coated PMS 418C

E. The system shall have minimum of 99 User Logins with associated user defined PIN password within six user levels to access any Nodes menu locally and remotely access.

F. Provide remote system access utilizing standard internet browser for systems status, and system reports.

G. System shall have the capability to provide email and SMS text messaging over a secure network firewall appliance within the main control panel for transmitting all system events to Owner’s designated personnel over the internal building LAN.

H. Control panel must be able to support minimum of 125 Addressable NAC Power Supplies with Global Synchronization visuals on any one SLC Addressable Loop. All visual notification appliances shall be globally synchronized through the facility.

I. The system performance specified herein is based upon minimum design performance requirements utilizing high fidelity speakers with the following minimum selectable sound performance levels from 81.5; 84.1; 87.3; and 90.5 dBA. The notification appliance network design including the quantity, type, placement, wattage tap setting and amplifier capacity for the Fieldhouse, Gymnasiums, Auditoriums and other designated large volumetric or cavernous spaces have been sound modeled to provide proper voice intelligibility for these acoustically challenging areas. Any deviations from this design, must be illustrate via professional modeling software to justify that the Speech Transmission Index (STI) intelligibility performance criteria is achieved in accordance with the required audibility (decibel sound level, dB) in all occupied and operating conditions. This sound modeling analysis shall be provided in 3 dimensional format on the fire alarm shop drawing submittal. This shall be reviewed at an additional expense to the contractor by an acoustical consultant of the Architects choosing.

J. Central Control Station (CCS), Autonomous Control Units (ACU) or Local Operator Console (LOC) shall have redundant operations, audio messages, paging microphone and request for control switches & status indicators. They all shall meet the minimum requirements listed below in all locations specified or shown on the drawings.

   1. Priorities shall be configured in software for operational needs between CCS, ACU and LOCs. The system shall support a minimum of 9 priority levels.

a. Each Command Center shall have switches with LCD Screen and/or LED annunciating control and requesting control as follows:
    1) Request Take Control
    2) Request Accepted
    3) Request Deny
    4) Restore command center to normal operation
    5) Priority request override Take Control

2. Color Touch Screen Display with:
    a. Display 8 simultaneous events with minimum of 768 character display.
    b. 42 character custom message
    c. 2,000 character instructional message per point
    d. Utilize Unicode symbols within the message
3. Audio Voice Communications
    a. Paging Microphone
    b. Audio Selector Switch(s) per paging zone and All Call.
    c. During local microphone paging the speakers located near by the microphone shall be muted through software programmable audio control relays
4. Disable control switches
5. Carbon Monoxide Annunciation
    a. Common Blue LED for Carbon Monoxide Activation
    b. Common Blue LED for Carbon Monoxide sensor end of life

K. **The Emergency Voice Paging System will provide audio paging up to the number of audio paging areas shown on the drawings** via a system microphone and telephone paging access. The paging system shall be used for routine and emergency paging. The notification appliance network shall be designed/circuited and installed in such a fashion to be able to conduct separate, discrete paging by selector switches for each of the zones hereinafter specified by the Architect/Engineer below:

L. Provide IP Telephone interface to system.

M. Provide telephone access paging interface selectable with the minimum paging zones described above, plus all call.
1. Provide a Session Initiation Protocoal (SIP) compliant IP gateway for interface to the Premise IP telephony network system.
2. Location: Gateway shall be located in the appropriate network resource room location and this contractor shall coordinate with the information technology drawings and the Architect for the proper location and include the required addressable fire alarm input, control, relay modules and auxiliary fire alarm audio circuitry for a complete interface to the SIP compliant gateway.
3. Acceptable Manufacturer:
    a. ClassConnectionES, Model VE-204A
    b. Gateway shall be configurable with a time delay to eliminate feedback noise
4. Gateway shall have a minimum of the following, subject to conformance with the required Fire Alarm/Mass Notification paging zones specified and/or shown on the drawings:
    a. (1) POE network RJ45 Port. POE power and UPS backup by others.
    b. (4) Analog Audio Outputs
    c. (4) Programmable Form C Relay Closures

d. (4) Programmable Contact Closure Inputs
e. (1) VM-186 RJ-45 Connector with 8 Pin Wiring Terminals for each Gateway Analog audio Port

5. Fire Alarm Interface minimum control requirements:
   a. Subject to the Fire Alarm Manufacturer's specific requirements, each analog audio paging zone shall have as a minimum the following:
   b. (1) Monitor Module Input for Gateway Relay Contact Closure
   c. (1) Dedicated Analog Audio Switching Circuit
   d. (1) Auxiliary line level audio input to the fire alarm control panel and/or amplifiers
   e. (1) Appropriate Line Level transformers where necessary for a functional system.

1.06 SUBMITTALS

A. The Contractor shall not purchase any equipment for the system specified herein until the Owner has approved the project submittals in their entirety and has returned them to the contractor with Owner's approval in writing. It is the responsibility of the contractor to meet the entire intent and functional performance detailed in these specifications. Approved submittals shall only allow the contractor to proceed with the installation and shall not be construed to mean that the contractor has satisfied the requirements of these specifications. The Contractor shall submit the lesser of three (3) complete sets of documentation, or as called for elsewhere as superseded by an order of precedence, within 30 calendar days after issuance of a mutually executed agreement.

B. Each submittal shall include a cover letter providing a list of each variation that the submittal may have from the requirements of the Contract Documents. In addition, the Contractor shall provide specific notation on each Shop Drawing, sample, catalog cut, data sheet, installation manual, etc. submitted for review and approval, of each such variation.
   1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to the Architect.
   2. Technical Submittals including Engineered Fire Alarm Installation layout Shop Drawings shall be prepared by persons with the following qualifications:
      a. Registered Professional Fire Protection Engineer which is a Licensed Professional Engineer who has passed the NCEES Principles and Practices of Fire Protection Engineering Examination licensed in the state which has jurisdiction.
      b. NICET Level III technician who has been certified at Level III in the sub-field of Fire Alarm Systems Layout.
      c. Submittals shall also include the Quality Assurance certifications of the Fire Alarm Technician (see Section 1.5).
      d. Distributor Qualifications: Provide documentation of the independently owned, Fire Alarm Distributor's qualifications, including all required local and state issued licenses, certificates and proof of authorization as a Manufacturer's Representative in Good Standing.

C. Product Data: Product Data sheets with the printed logo or trademark of the manufacturer of all equipment. Indicated in the documentation shall be the type, size, rating, style, and catalog number for all items proposed to meet the system performance detailed in this specification. The proposed equipment shall be subject to the approval of the Owner.

D. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
   1. Comply with all recommendations in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72 as a requirement.

2. Include voltage drop calculations for notification appliance circuits based on manufacturer-provided panel start voltage and point-to-point notification appliance circuit calculations. System Layout drawings prepared using the Lump Sum Method for visual strobe circuits are not acceptable.
3. Include battery-size calculations. Batteries shall include a 20% safety factor above the minimum requirements derived from calculations, as required by NFPA 72.
4. Include performance parameters and installation details for each detector, verifying that each detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
5. Locate all detectors in accordance with the installation standards as prescribed by the applicable edition of NFPA 72.
6. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.
7. Indicate speaker wattage tap settings for all speakers on the floor plans, calculate and show dB Line Loss calculations for all speaker circuits using the Lump sum method. dB Losses shall be no greater than 3.0 dB from amplifier start terminals to last device.
8. Indicate all Acoustically Distinguishable Areas as determined by the Architect/Engineers Contract Documents on the installation shop drawings.
9. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits from end-to-end. "Home Run" indicators or other non-end-to-end wire path designations are not acceptable.

E. Operation and Maintenance Data: For fire-alarm systems and components to be included in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data, include the following:
1. Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
2. Provide "Record of Completion Documents" according to NFPA 72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter.
3. Record copy of site-specific software database file, hardcopy printout and CD, with password for delivery to the owner. The system will also store copy of the database on the system, available for upload. Proprietary system/service companies will not be acceptable.
4. Provide "Maintenance, Inspection and Testing Records" according to NFPA 72 article of the same name and include the following:
    a. Frequency of testing of installed components.
    b. Frequency of inspection of installed components.
    c. Requirements and recommendations related to results of maintenance.
    d. Manufacturer's user training manuals (hardcopy) and electronic on CD.
5. Manufacturer's required maintenance related to system warranty requirements.
6. Abbreviated operating instructions for mounting at fire-alarm control unit.

F. Software and Firmware Operational Documentation:
1. Flash Memory media of site-specific software database file with password, all product data sheets and AutoCAD files. Provide hard copy printout of the software program. Proprietary system/service companies will not be acceptable.
2. Provide a list of global system settings
3. Provide a list of the contents of each system cabinet and their settings
4. Provide a list of all addressable devices with their addresses and settings.

5. All information shall be housed in the Document Storage Cabinet, see Part 2 - Products for Specification.

1.07 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.
B. Conform to requirements of NFPA 72.
C. Conform to Illinois Administrative Code 180 and all building codes as listed in IAC section 180.60.
D. Single-Source Responsibility: Obtain fire alarm components from a single source ISO 9002 certified manufacturer who assumes responsibility for compatibility for system components.
E. Compliance With Local Requirements: Comply with the applicable building code, local ordinances, and regulations, and the requirements of the authority having jurisdiction.
F. All new devices shall be certified U.L. listed and cross listed for use with the main fire alarm control panel and shall bear the same manufacturer's name on the main control panel as well as all the remote devices. Systems having equipment with various manufacturers' names will not be acceptable.
G. All control equipment must have transient protection to comply with UL864 requirements.
H. Where Fire Alarm circuits leave the building, additional transient protection must be provided for each circuit. Devices must be UL listed under standard #497B (Isolated Loop Circuit Protectors).
I. Installer Qualifications: Fire Alarm distributor’s employed personnel shall be trained and certified by manufacturer on the make and model of the fire alarm control panel specified for this Project.
J. Additional Installer Qualifications: Installation shall be by personnel certified by NICET as a technician who has been certified at Level II in the sub-field of Fire Alarm Systems Layout.
K. Project Manager Qualifications: Installation shall be supervised by personnel certified by NICET as Fire Alarm System Layout Level IV Technician (SET), an NFPA Certified Fire Protection Specialist (CFPS) or an NCEES accredited Licensed Fire Protection Engineer (FPE).
L. Source Limitations for Fire-Alarm System and Components: Obtain fire-alarm system from single source from single distributor and manufacturer. Components shall be compatible with, and operate as a fully U.L. listed extension of a U.L. 864 listed fire alarm control system.
M. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA70, by a qualified testing agency, and marked for intended location and application.
N. Fire Alarm Distributor Qualifications:
    1. Contractor shall utilize an Illinois Licensed Private Alarm Contractor Agency that is an authorized, independently owned Manufacturers representative of the specified fire alarm equipment manufacturer.
    2. Fire Alarm Distributor shall be a full service entity qualified to provide the engineering for the technical submittal, furnishing of the equipment, commissioning, testing and inspection services outlined herein including intelligibility testing and capable of providing full repair service to any fire alarm system and/or provide fire alarm system installation and design including, but not limited to, the following minimum requirements:
        a. Qualified Fire Alarm Service Company with employees who meet the criteria defined by NFPA 72 for the qualifications of both System Designers and System Installers to include the requirements of the Authorities Having Jurisdiction (AHJ).
        b. Certified Fire Alarm Service Inspectors with employees of the entity who are certified in Fire Protection Engineering Technology by the National Institute for Certification in Engineering Technologies (N.I.C.E.T.) in FIRE ALARM SYSTEMS

c. Five (5) Years of demonstrated experience with intelligibility measurement technology and testing (minimum) is required for this project and the Fire Alarm Distributor shall provide intelligibility measurement equipment capable of registering and recording Intelligibility readings in accordance with IEC 60268-16, Sound System Equipment - Part 16: Objective Rating of Speech Intelligibility by Speech Transmission Index. Equipment shall have been calibrated within one (1) year of the commencement of the intelligibility testing for this project.

3. Distributor shall be a registered Illinois legal entity (Corporation, Partnership, Professional Corporation or Limited Liability Company) in Good Standing with the Secretary of State of Illinois.
4. Distributor entity shall hold a valid Illinois Private Alarm Contractor Agency
5. License. Sub-contractors or licensed individual Private Alarm Contractors DO NOT meet this requirement.
6. Distributor entity shall be qualified by the AHJ, including the Illinois Department of Professional Regulation to provide engineering design services for a fire alarm and mass notification system as evidenced by holding an Illinois Registered Professional Design Firm license. Sub-contractors or individually licensed individual Registered Architects, Professional or Structural Engineers DO NOT meet this requirement.
7. All service employees of the entity shall have a valid Illinois Permanent Employee Registration Card (P.E.R.C.).

1.08 MANUFACTURER'S FIELD SERVICES

A. The following supervision of installation shall be provided by trained service technician who is employed by the manufacturer of the fire alarm equipment. The technician shall be NICET certified and have had a minimum of four (4) years of service experience in the fire alarm industry. The technician's name shall appear on equipment submittals and the letter of certification from the fire alarm system manufacturer. The manufacturer's service technician shall be responsible for the following items:
   1. Pre-installation visit to the job site to review equipment submittals and verify method by which the system should be wired.
   2. During job progress, make weekly job site visits to verify installation and wiring system.
   3. Upon completion of wiring, final connections shall be made under the supervision of this technician, and final checkout and certification of the system.
   4. At the time of final checkout, technician shall give operational instructions to the Owner and/or his representative on the system.
   5. Three (3) months after final checkout, technician shall return to job site and re-configure system according to Owner's requirements.
   6. All job site visits shall be dated and documented in writing and signed by the manufacturer's representative. Any discrepancy will be noted on this document and a copy kept in the system job folder which will be turned over to the project Engineer.

1.09 EXTRA MATERIALS - ATTIC STOCK

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Provide quantity equal to 2% percent of amount of each type installed, but no less than 1 unit of each type.
      a. Smoke Detectors, heat detectors, manual pull stations, duct smoke detector, monitor modules and control modules:

b. Notification appliances; speakers, speaker-strobes and strobes.

B. Keys: The installing contractor shall collect all equipment spare keys provided with each lockable or resettable device/cabinet and shall turn all of them over to the Owner at completion.

1.10 MISCELLANEOUS DEVICE ALLOWANCE

A. Contractor shall provide an allowance built into the project's base bid to allow for the acquisition and installation of the following devices:

B. Carbon Monoxide detector (Standard Environment - see definition below): 1

1. Carbon Monoxide detector (Harsh Enviornment - see definition below): 1
2. Duct smoke detectors: 2
3. Smoke detectors: 4
4. Rate of Rise Heat detectors: 2
5. Pull stations: 2
6. Notification appliance - Visual: 2
7. Notification Appliance - Speaker/visual: 4

C. Equipment shall be provided and installed complete at locations as determined by Owner/Architect or Engineer in field. Equipment is subject to the following special conditions:

D. Contractor shall provide a unit cost for each device as described above. The Contractor will return money, based upon the per unit costs, for all devices not installed at the end of the project. A full accounting of all devices described here will be a necessary condition for final payment.

E. Written approval from the Owner/Architect for installation of any of the before mentioned devices will be necessary. Any devices installed without prior written approval shall be considered property of the Owner and will not be accounted for under this portion of the specification.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Edwards/EST

B. Being listed as an acceptable Manufacturer in no way relieves the Contractors obligation to provide all equipment and features in accordance with these specifications.

C. If equipment of another manufacturer is submitted for approval, the Contractor shall state how much is to be deducted from the base bid for the substitution, and also shall state what, if any, specific points of system operation differ from the specified points of the system operation. This differentiation report must reference every paragraph of this specification.

D. The Manufacturer shall be a nationally recognized company specializing in smoke detection and fire alarm systems. This organization shall employ factory trained and NICET certified technicians, and shall maintain a service organization within 100 miles of this project location. The Manufacturer and service organization shall have a minimum of 10 years experience in the fire protective signaling systems industry.

2.02 SYSTEMS OPERATIONAL DESCRIPTION

A. Mass Notification initiated event shall override any event and take the highest system priority.

B. Fire-alarm signal initiation shall be by one or more of the following devices:

1. Retain only those devices and systems in subparagraphs below that are applicable to Project. Coordinate with requirements in other Sections that specify listed devices and systems.
2. Manual stations.
3. Heat detectors.
4. Retain one or both of first two subparagraphs below. Coordinate with Drawings if retaining both.
5. Smoke detectors.
6. Duct smoke detectors.
7. Verified automatic alarm operation of smoke detectors.
8. Automatic sprinkler system water flow.
9. Heat detectors in elevator shaft and pit.
10. Fire-extinguishing system operation.

C. Fire-alarm signal shall initiate the following actions where applicable to this facility and jurisdiction:
1. Retain only those actions in subparagraphs below that are applicable to Project. Coordinate with requirements in other Sections that specify listed devices and systems.
2. Activate multiple channel pre-recorded voice messages preceded and followed by temporal tone.
3. Continuously operate the visual notification appliances.
4. Identify alarm at fire-alarm control unit and remote annunciators.
5. Transmit an alarm signal to the remote alarm receiving station.
6. Unlock electric door locks in designated egress paths.
7. Release fire and smoke doors held open by magnetic door holders.
8. Switch heating, ventilating, and air-conditioning equipment controls to fire alarm mode.
9. Activate stairwell and elevator-shaft pressurization systems.
10. Close smoke dampers in air ducts of designated air-conditioning duct systems.
11. Coordinate first subparagraph below with "Elevator Recall" Paragraph in "Fire-Alarm Control Unit" Article.
12. Recall elevators to primary or alternate recall floors.
13. If supplies are not essential to life safety, retain first subparagraph below for shutoffs installed in supplies that may be hazardous.
14. Activate emergency shutoffs for gas and fuel supplies.
15. Record events in the system memory.
16. Record events by the system printer (if shown or called for in the contract documents).

D. Carbon Monoxide activation (Supervisory) signal shall initiate the following actions:

E. Carbon Monoxide End of Life Monitor signal shall initiate the following actions:
1. Retain only those actions in subparagraphs below that are applicable to Project. Coordinate with requirements in other Sections that specify listed devices and systems.
2. Activate BLUE Led (Flash Solid) on the fire alarm control panel and remote annunciators - “Carbon Monoxide End of Life”.
3. Record events in the system memory.

F. Supervisory signal initiation shall be by one or more of the following devices and actions:
1. Retain only those devices and actions in subparagraphs below that are applicable to Project. Coordinate with requirements in other Sections that specify listed devices and systems.

2. Valve supervisory switch.
3. Low-air-pressure switch of a dry-pipe sprinkler system.
4. Elevator shunt-trip supervision.
5. Duct smoke detector activation.

G. System trouble signal initiation shall be by one or more of the following devices and actions:
1. Retain only those devices and actions in subparagraphs below that are applicable to Project. Coordinate with requirements in other Sections that specify listed devices and systems.
2. Open circuits, shorts, and grounds in designated circuits.
3. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
4. Loss of primary power at fire-alarm control unit.
5. Ground or a single break in fire-alarm control unit internal circuits.
6. Abnormal ac voltage at fire-alarm control unit.
7. Break in standby battery circuitry.
8. Failure of battery charging circuitry
9. High or low battery charge.
10. Abnormal position of any switch at fire-alarm control unit or annunciator.
11. Fire-pump power failure, including a dead-phase or phase-reversal condition.
12. Low-air-pressure switch operation on a dry-pipe or pre-action sprinkler system.
13. System Trouble and Supervisory Signal Actions: Initiate notification appliance and annunciate at fire-alarm control unit and remote annunciators. Record the event on system printer.

H. Elevator Recall:
1. Smoke detectors at the following locations shall initiate automatic elevator recall. Alarm-initiating devices, except those listed, shall not start elevator recall.
a. Elevator lobby detectors except the lobby detector on the designated floor.
b. Smoke detector in elevator machine room.
c. Smoke detectors in elevator hoistway.
2. Elevator lobby detectors located on the designated recall floors shall be programmed to move the cars to the alternate recall floor.
3. Water-flow alarm connected to sprinkler in an elevator shaft and elevator machine room shall shut down elevators associated with the location without time delay.
a. Water-flow switch associated with the sprinkler in the elevator pit may have a delay to allow elevators to move to the designated floor.

2.03 FIRE-ALARM CONTROL UNIT

A. The System supplied under this specification shall be UL864 - 10th Edition Listed fire detection, 100 Channel network one-way voice communication system utilize IPv6 communications format for peer-to-peer network communication operations. Which allows node to node, or node to annunciator, communication to occur across a single pair of wires or single fiber optic cable strand. The network shall consist of a main node Central Control Station (CCS), multiple remote control panel nodes Autonomous Control Unit/Remote Control Panels (ACU/RCP) and nodes operating as Local Operators Consoles (LOCs)/annunciators. Each node shall display all system network points and full command & control functions on color LCD touch screen display. No master slave arrangement is allowed.

1. The system shall be model EDWARDS, model EST4.
2. Cabinet enclosure shall be Bronze; Pantone Coated PMS 418C

B. For systems requiring multiple redundant locations for paging control, the ability to Request/Grant/Deny page privileges shall be supported in any combination. Priorities based on wiring locations are not considered equal. Priorities shall be configured in software for operational needs between Autonomous Control Units (ACU), Central Control Station (CCS) and Local Operators Consoles (LOCs). The system shall support a minimum of 9 priority levels.

C. System enhance survivability, the network shall be MESH type (capable of both series, series-parallel and single network bridge) communications allowing for multiple Class X/A/B rings within the system. Each node shall be an equal, active functional member of the network, capable of making all local decisions, local pre-recorded voice message storage and initiating network tasks for other nodes. In the event of a node failure or communications failure between nodes, nodes shall be capable of forming sub-networks and remain operational between communicating nodes with all pre-recorded voice messages announcements. No central storage of pre-recorded voice messages will be acceptable.

D. The network of control panels shall include the following features.
1. Ability to download all network applications and firmware from the configuration computer on the network or at any control panel (network node) location.
2. During System download of the database, the System shall be completely operational.
3. The system database will reside on specified Node and able to upload, from any location on the Network.
4. Each control panel (network node) shall have an LCD color touch screen display with common controls. The display shall be configurable to display the status of all system points and all combinations of alarm, supervisory, trouble, monitor, or group event messages.
5. From each LCD color touch screen display on the system shall be capable of being programmed for control functions of any node or the entire network. The LCD display shall reside on the network as a node and continue to operate with fault on the network. An LCD can be programmed to be only operation when a node is operational in stand-alone mode, with a network fault.

E. User Operator Login Credentials
1. Provide 99 User authorized operator log-in’s with custom password with the ability to operate or modify system functions such as remote access, system time, date, passwords, holiday dates, restart the system and clear the control panel event history file.

F. Each network Node control panel shall be capable of:
1. Supporting up to 2500 intelligent analog/addressable points.
2. Supporting up to ten (10) intelligent addressable loops, each loop supporting 125 detectors and 125 modules, total of 250 points.
3. Supporting four (4) USB communication ports and protocol. All USB connections shall have a Secure Encryption Technology.
4. Support global synchronization of visual notification appliances controlling minimum of 125 Addressable NAC Power Supplies on any one or combination of all ten SLC circuits.

G. Color Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. The system shall provide the following event queues as a minimum each to include a count of active events for the queue type including a visible indicator showing if

events have not been reviewed: Alarm, Emergency, Supervisory, Disable/Test, Trouble, Ground Fault, Monitor, Requested/Granted control.

H. Shall be a color touchscreen LCD user interface control/display that shall annunciate and control system functions with:
   1. Display 8 simultaneous events.
      a. Minimum of 768 character display.
      b. 40 character custom message
      c. 2,000 character instructional message per point.
      d. Utilize Unicode symbols within the message. Unicode symbols to better define messaging including but not limited to radioactive symbol, poisonous substances (skull and crossbones) symbol, biological hazard symbol and Caduceus symbol.
      e. The LCD allows the use of on screen scrolling via display switches or by 'swiping' the display screen.
   2. The reset, alarm silence, panel silence and drill system control switches shall provide color coding for ease of distinguishing one from the other.
   3. An authorized user shall have the ability to operate or modify system functions including system time, date, passwords, holiday dates, to disable/enable devices, zones, actions, timers, sequences, restart the system and clear control panel event history file.
   4. Graphical tree map representation of the project entire system shall allow an authorized user to activate/restore outputs, actions, sequences, intelligent addressable detectors or module, simulate detector smoke levels. The selection of devices, zones, actions, timers and sequences shall be made via a descriptive facility structure view.

I. Audio One-Way Voice Communications
   1. **Default audio amplifier shall be 1B3-250 power amplifier rated at 250 watts continuous (RMS) power.**
   2. The voice communication network shall be 100 audio channels to allow up to 100 simultaneous announcements/paging.
   3. Enhanced system survivability, custom digital voice message shall be provided, a minimum of 750 minutes and shall be stored within every Node on the network. All custom voice messages shall be professional recorded as a .wav file format. The system shall support repeat counts of audio messages and stacking of audio messages in a FIFO configuration
   4. Provide as minimum one twenty (20) watt supervised audio amplifier per paging zone. The system software shall be capable of selecting the required audio source signal for amplification. To enhance system survivability, each audio amplifier shall automatically provide an internally generated local 3-3-3, 1000 Hz temporal pattern output upon loss of the audio signal from the one-way emergency audio control unit, during an alarm condition.
   5. Audio amplifiers shall be power limited and protected from short circuits conditions on the audio circuit wiring. Each amplifier output shall be a supervised, dedicated, selectable 25/70 Vrms output. Amplifiers sizes shall be minimum of 20 watts and largest 250 watts.
   6. Amplifier Minimum Sizing Specification shall be as follows:
      a. 250 watts per OMNI Directional Paging Speaker.
      b. 24 watt per Medium Power Speaker
      c. 7.5 Watts per Trumpet Type Loudspeaker.
      d. 1 Watts per 4 inch cone type speaker.
      e. 4 Watts per re-entrant horn-driver type speaker.

f. Plus 25% spare capacity for each connected amplifier or speaker signal circuit switching module.

J. Provide an Emergency Voice Communication System with the following design features:
   1. An audio control unit with Microphone for Paging.
   2. Below is verbiage for Two Visual Strobe operation - Fire Strobe and Alert Strobe - Verify Project Requirements
   3. Provide 3-position switch for each evacuation signaling zone and “All-Call”, with "Page Auto" and “Page ALERT” positions identified and two LED status indicators for each audio visual evacuation signaling "zone", one red and one yellow.
      a. These LED's shall illuminate to indicate respectively:
         1) Evacuation signals activated (red),
         2) Trouble in audio (speaker) or visual (strobe) circuit(s) (yellow).
   4. Edit the switch operations per project scope requirements.
   5. Provide 2-position switch for manually activate pre-recorded voice messages, with “Message Name" positions identified and one LED status indicators, one red. Provide minimum of 12 selector switches.
      a. These LED's shall illuminate to indicate respectively:
         1) Message activated (red)
   6. Edit the switch operations per scope requirements
   7. Provide 2-position switch for manually activate audio paging zones with “Paging Zone Name” positions identified and one LED status indicators, one red. Provide minimum of 12 selector switches.
      a. Evacuation signals activated (red),
         1) Trouble in audio (speaker) or visual (strobe) circuit(s) (yellow).
   8. All LED and switch functions shall be software programmable. Switches shall be configurable for momentary, maintained, toggle, or “exclusive or” operation as required by the application. Any group of switches may use “exclusive or” in combination of 2 switches to 24 switches in a group.
   9. LEDs shall be dynamically programmable for slow flash, fast flash or steady operation.
   10. Configurable switches and LED indicators to support auxiliary functions with software selectable LED colors of Red, Yellow, Blue, Green or White.

K. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions

L. Network Communications Topology
   1. The peer-to-peer network shall be IPV6 network to multiple nodes and LOC/annunciators consisting of the command center, main controller, remote control panels and color LCD/LED annunciation support data transmission of data, voice audio and firefighters’ telephone data on a single twisted pair or single optical fiber. The network communications format shall include Globally Unique Identifiers to help ensure only nodes communications on the network, providing cyber security. Total network response shall not exceed 3 seconds.
   2. Each node is an equal, active functional node of the network, which is capable of making all local decisions in the event of a node failure or communications failure between nodes. The network shall support a back-to-back pass-through degraded mode for like copper wiring and for copper to fiber in any combination. The pass through shall maintain

network connectivity on power down or catastrophic failure of a single panel, networks that do not support network pass-through shall not be considered equal.

3. When a network is wired in a Class B configuration, a single break or short on the network wiring isolates the system into two groups of nodes. Each group continues to function as a peer-to-peer IPv6 network working with their combined databases. All pre-recorded voice messages will still be operations regardless of any network fault.
4. When wired using a Class A/X or MESH configuration, a single break or short on the network wiring causes the system to isolate the fault, and network communication continues uninterrupted, without any loss of function. Should multiple wiring faults occur, the MESH network re-configures into many sub-networks and continues to respond to alarm events from every panel that can transmit and receive network messages. All pre-recorded voice messages will still be operations regardless of any network fault.
5. Sysystem network shall be wired Class X with fiber optic cable.
6. Network interface controllers shall be small form factor pluggable (SFP) and shall be hot pluggable.
    a. The fiber optic network interface shall be:
        1) Multi-Mode 2 strand

M. Proxy Firewall - Cyber Security
1. The control panel shall have a UL864 listed Proxy Firewall for connection to site TCP/IP network for remote connectivity to internet or intranet.
2. Proxy Firewall module(s) shall protect against cyber attacks using 256 bit AES encryption, cybersecurity measures that shall meet or exceed FIPS PUB 197.
3. The system shall only transmit credentials that are encrypted. The system shall provide for multiple users, roles to ensure proper access by user for the role they perform on the system. All passwords shall use a Cypher Algorithm, password must use a hash, no password or authentication shall be exposed in any format in the system database viewable as plain text. Sensitive information shall not be logged to history or displayed on service tools (eg. passwords, PINs etc.).
4. Security relevant information, such as: failed login attempts, failed unauthorized accesses, and user modification shall be logged to panel history. Unsuccessful authentication attempts shall not leak information regarding the presence of the system or users.
5. Email messages support multiple languages in native characters and match the languages supported in the panel.
6. Email messages support symbolic and color alarm event highlighting.
7. Two 100 Mbps Small Form-factor Pluggable (SFP) network adapter ports.
8. Firewall with cyber security shall be used for connectivity:
    a. 4-CU Programming Laptop / local or remote
    b. FireWorks Workstation or Server
    c. IP Central Station
    d. Email server and SMS gateway
    e. BAS BackNet connection
    f. Elevator controller interfaces for OEO operations
    g. Remote Web services

N. Reports (Local & Remote Access)
1. The system shall provide the operator with system reports that give detailed description of the status of system parameters for corrective action, or for preventative maintenance

programs. The system shall provide these reports via the main LCD Color Touch Screen display and via a standard browser.

2. Reports provided by web browsers shall be capable of being saved for archiving and detailed analysis. Reports retrieved from the LCD Color Touch Screen display shall be capable of being printed on any system printer configured for the purpose
3. Utilizing remote connectivity using standard internet browser ie; Internet Explorer, Edge, Chrome, Safari, and Firefox on any device that supports the browser. Systems that require the use of a specific device type or AP for accessing reports shall not be considered equal
4. User shall require proper authentication locally or remotely; authorized Login & Password to access the system. System supports 99 customer User with PIN password.
5. System status report of the system current conditions.
6. History report shall provide a chronological listing of at least the last 10,000 system events in addition a minimum of 10,000 Alarm events shall be captured and stored. The system shall support capturing of 10,000 most recent events, this captures an incident history which cannot be overwritten until history is cleared or an additional most recent events capture is made.
7. Detector report shall provide a sensitivity listing of all detectors that shall list all of the sensitivity of all of the detectors on any given panel in the system. The system shall provide a report that provides a sensitivity (% Obscuration per foot) listing of any particular detector. The systems shall provide graphical representations of Sensitivity and Dirty levels in reports displayed on a system LCD or web browser for quick recognition of device status.
8. Carbon Monoxide reports “sensitivity” check from the panel shall report the approximate number months of CO sensor life remaining. The systems shall provide graphical representations of CO sensor life remaining in reports displayed on a system LCD or web browser for quick recognition of device status.

O. Panel/System History
   1. The panel history shall support storage of up to 20,000 events. History events shall include but not be limited to Event Type, System Command operations, Date and time of the event. Reports shall be displayed locally on the panel LCD display, printed to a system printer, review through a web browser and support exporting to .xml file format.
   2. To enhance forensic examination of history, the system shall support the ability to store the FIFO event history log into a separate region of the database, not impacted by the FIFO operation of events preventing overwriting during forensic examination of an incident. Placing an archive of the History into a separate region of the database shall not interrupt FIFO of the main history or erase any portion of the main History.
   3. Both FIFO history and archived history shall be available for review through the panel LCD display, be printable through the system printer, retrievable through web services interfaces and be exportable as .xlm formatted file.

P. Verify project requirements for Central Station Connection Phone Line DACT or IP DACT.

Q. Digital Alarm Communicator Transmitter: Unless superseded by local regulations or codes requiring a radio transmitter, the system shall have an integrated off premise communications capability using a digital alarm communications transmitter (DACT) for sending system events to multiple central monitoring station (CMS) receivers. The system shall provide the CMS(s) with point identification of system events using 4/2, 3/1, Contact ID or SIA DCS protocols. The dialer shall have the capability to support up to 255 individual accounts and to send account information to eight (8) different receivers, each having a primary and secondary telephone access number. System events shall be capable of being directed to one or more receivers depending on event type or location as specified by the system designed. In the event of a panel

CPU failure during a fire alarm condition, the DACT degraded mode shall transmit a general fire alarm signal to the CMS. It shall be the Contractor's responsibility to verify the local regulations or codes for Off Premises Emergency Response signaling requirement prior to submitting their bid.

R. IP Digital Alarm Communicator Transmitter
   1. The system shall provide off premises communications capability using a native TCP/IP Ethernet based Digital Alarm Communications Transmitter (IP/DACT) for sending system events to multiple Central Monitoring Station (CMS) receivers over an IP path.
      a. IP configuration shall support, single and dual path communications.
      b. IP service shall provide 128 bit AES Advanced Encryption Standard "FIPS PUB 197".
      c. Up to 8 eight communication services shall be supported per module. Up to 10 modules shall be supported per system. System events shall be capable of being directed to one or more receivers depending on event type or location as specified by the system design.

S. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, shall be powered by nominal 24-V dc source.

T. Secondary Power: Shall provide 60 hours supervisory and 15 minutes of alarm with batteries, automatic battery charger, and automatic transfer switch or as superceded by the local building code or installation standard ammendments.

2.04 REMOTE ANNUNCIATOR WITH ONE-WAY VOICE COMMUNICATION - LOCAL OPERATOR CONSOLE [(LOC) OR (FAAP)]

A. Annunciator shall match those of fire-alarm control unit LCD display functions for alarm, supervisory, monitor and trouble indications and common system controls including; acknowledging, silencing, resetting, and testing. The fire alarm bypass function switches and LCD Keypad may be housed separately in a locked enclosure to prevent unauthorized use and control of fire alarm system program control and bypass, but the Paging Microphone, Audio Selector and Message Selector Switches shall be housed in a listed enclosure which is capable of being fitted with an unlocked latching knob for the enclosure, such that these emergency communication and signaling controls are readily accessible for emergency signaling. The Contractor shall verify this feature with Owner prior to final commissioning.
   1. This display shall be EDWARDS-KIDDE, model 3-LCD with a 3-LCDANN and shall have the following minimum features:
      a. LCD Display
      b. Paging Microphone
      c. Audio Selector Switches
      d. Audio Message Selector Switches
      e. System Bypass Switches
   2. The system shall provide the following event queues as a minimum each to include a count of active events for the queue type including a visible indicator showing if events have not been reviewed: Alarm, Emergency, Supervisory, Disable/Test, Trouble, Ground Fault, Monitor, FirePhone call in, Requested/Granted control
   3. Cabinet enclosure shall be Bronze; Pantone Coated PMS 418C

2.05 REMOTE ANNUNCIATOR (FAAP) DISPLAY AND CONTROL ONLY - NO 1-WAY VOICE

A. Annunciator shall match those of fire-alarm control unit color touch screen LCD display functions for alarm, supervisory, monitor and trouble indications and common system controls including; acknowledging, silencing, resetting, and testing.
B. The annunciator shall provide the following event queues as a minimum each to include a count of active events for the queue type including a visible indicator showing if events have not been reviewed: Alarm, Emergency, Supervisory, Disable/Test, Trouble, Ground Fault, Monitor, Requested/Granted control.
C. CABINET ENCLOSURE SHALL BE BRONZE; PANTONE COATED PMS 418C.

2.06 NAC POWER SUPPLY:

A. The NAC power supply shall be independent unit that will provide power to visual strobe notification appliances. It shall be possible to configure the NAC's to follow the main panel's NAC or activate from intelligent synchronized modules. The booster NAC's must be configurable to operate independently at any one of the following rates: continuous synchronized, or 3-3-3 temporal. Fault conditions on the power supply shall not impede alarm activation of host NAC circuits or other power supplies. The NAC power supply must be able to provide concurrent power for notification devices, security devices, access control equipment and auxiliary devices such as door holders. . All the NAC Power Supplies shall be synchronized. The power supply shall support up to 24 amp hour batteries.
    1. Power supply shall be minimum of 10 amps and UL 864 Listed.
    2. Four independent 3.0 amp NAC circuits. Each being configurable as auxiliary power.
    3. All circuits shall be synchronized.
    4. Shall be EDWARDS-KIDDE, model BPS10A or APS10A

2.07 INTELLIGENT ANALOG SYSTEM SMOKE, HEAT AND CARBON MONOXIDE DETECTORS

A. General Requirements for Intelligent Analog Detectors
    1. Integral Microprocessor: All decision are made at the detector determining if the device is in the alarm or trouble condition.
    2. Non-Volatile Memory: Permanently stores serial number, and type of device. Automatically updates historic information including hours of operation, last maintenance date, number of alarms and troubles, time of last alarm1 and analog signal patterns for each sensing element just before last alarm.
    3. Field Replaceable Smoke Sensing Chamber: Analog detectors must have a modular, removable smoke sensing chamber which can be removed for easy cleaning and/or convenient, cost effective service replacement without removing the detector base or resetting the device address, without removal of detector electronics and without requiring any system or device programming adjustments which necessitate a system re-test.
    4. Electronic Addressing: Permanently stores programmable system address. It shall be possible to address each intelligent module without the use of DIP or rotary switches. Devices using switches for addressing shall not be acceptable.
    5. Automatic Device Mapping: Each detector transmits wiring information regarding its location with respect to other devices on the circuit, creating an As-Built wiring diagram. This will also provide enhanced supervision of the device physical location and the device

message shall reside with the location and not the device address. Devices installed in the wrong location will always report the correct message of the physical location.

6. Sensitivity Range: Each analog addressable smoke detector's sensitivity shall be capable of being programmed individually as: most sensitive, more sensitive, normal, less sensitive or least sensitive. It shall be possible to automatically change the sensitivity of individual analog/addressable detectors for the day and night periods. It shall be possible to program control panel activity to each level.
7. Pre-Alarm: Detector stores 20 pre-alarm sensitivity values to alert local personnel prior to the sensor reaching a full evacuation sensitivity. Sensitivity values can be set in 5% increments.
8. Environmental Compensation: The detector's sensing element reference point shall automatically adjust, compensating for background environmental conditions such as dust, temperature, and pressure. Periodically, the sensing element real-time analog value shall be compared against its reference value. The detector shall provide a maintenance alert signal when the detector reaches 75% (Dirty) to 99% (More Dirty) compensation has been used. The detector shall provide a dirty fault signal when 100% or greater compensation has been used.
9. Twin Status LEDs: Flashing Green LED shows normal; flashing RED shows alarm state; steady RED and steady GREEN show alarm state in stand-alone mode, visible from any direction.
10. UL Sensitivity Testing: The detector shall utilize a supervised microprocessor that is capable of monitoring the sensitivity of the detector. If the detector sensitivity shifts outside of the UL limits, a trouble signal is sent to the panel.
11. Device Replacement: The system shall allow for changing of detector types for service replacement purposes without the need to reprogram the system. The replacement detector type shall automatically continue to operate with the same programmed sensitivity levels and functions as the detector it replaced. System shall display an off-normal condition until the proper detector type has been installed or change in the application program profile has been made.

B. Intelligent Multi-Criteria Optical Smoke Detector

1. Provide a multi-criteria optical smoke detector utilize two forward (Blue LED & IR LED) & backward light scattering type technology to identify smoke particles within the sensor chamber, sampling the air from its surroundings without the use of other sensing elements. Each optical smoke detector shall be capable of rejecting nuisance sources and detect smoke in the full life safety window of 0.5% to 4.36% obscuration/foot. Shall be listed to UL268 7th edition. Detectors that have to operate in a special application mode that cannot achieve the full 0.5% to 4.36% life safety window or utilize sensing technology that has a fixed end of life components shall not be considered equal.
2. Detector shall be UL268 7th Edition Certified being high resistance to nuisance sources; ie cooking, aerosols and steam, in accordance with NFPA 72-2019, Chapter 29.
3. Each smoke detector shall be individually programmable to operate at any one of five (5) sensitivity settings. The detector shall also store pre-alarm and alternate pre-alarm sensitivity settings. Pre alarm sensitivity values shall be configurable in 5% increments of the alarm and alternate alarm sensitivity settings respectively. The detector shall be able to differentiate between a long term drift above the pre alarm threshold and fast rise above the threshold. The detector shall monitor the sensitivity of the smoke sensor. If the sensitivity shifts outside the UL limits, a trouble signal shall be sent to the panel. It shall be possible to automatically change the sensitivity of individual intelligent addressable smoke detectors for day and night (alternate) periods.

4. Each detector shall utilize an environmental compensation algorithm that shall automatically adjust for background environmental conditions such as dust, temperature, and pressure. The detector shall provide a maintenance alert signal when 80% (dirty) of the available compensation range has been used. The detector shall provide a dirty fault signal when 100% or greater compensation has been used.
5. Smoke Detectors that utilize any technology that have an end of life component shall not be acceptable.
6. Provide EDWARDS, model SIGA-OSD.

C. Intelligent Photoelectric Detector
1. Provide intelligent analog addressable photoelectric smoke detectors at the locations shown on the drawings.
2. Provide EDWARDS-KIDDE, model SIGA2-PS.

D. Intelligent CO (Carbon Monoxide) Detector - Standard Type.
1. Where called for on the contract drawings, provide intelligent CO sensor at locations shown on the drawings. The CO sensor (or combination type sensor) shall reside on the Intelligent Addressable loop with its unique system identifier and be able to be programmed as Alarm, Supervisory or Monitor.
2. CO sensor shall be capable of detecting carbon monoxide from any source of combustion and analyzes the sensor data to determine when to initiate a life safety CO alarm. Carbon monoxide electrolytic sensing module shall provide toxic gas sensing to UL2034 and UL2075 standards.
3. The detector shall be equipped with a sounder base (local alarm only)
4. The CO element shall have minimum of six year life span and be field replaceable element without. The CO element shall be factory calibrated.
5. The CO end of life shall be supervised / monitored by the Control Panel to annunciate end of life. Also, the control panel shall provide a system report of all CO detectors end of life status.
6. The CO Detector shall activate upon the following conditions:
    a. 70 PPM for 60 - 240 minutes
    b. 150 PPM 10- 50 minutes
    c. 400 PPM 4 - 15 minutes
7. The CO activation shall be programmable type as follows: Alarm, Supervisory Latching, Supervisory Non-Latching, Monitor Latching, or Monitory Non-Latching.
8. Provide EDWARDS-KIDDE, model SIGA2-COS.

E. CO (Carbon Monoxide) Detector - Harsh Environment
1. Provide in all kitchen and Boiler Room locations
2. The detector shall include a locally mounted remote sounder (local alarm only)
3. Power: 3 W (max) from 12 to 24 VAC or 12 to 32 VDC
4. Current @ 24 VDC: 75 mA in alarm, 50 mA fan relay on and 23 mA stand by
5. Shipping Weight: 1 pound (0.45 kg)
6. Size: 4 1/2 x 4 x 2 1/8 in. (11.4 X 10.2 X 5.4 cm)
7. Color: Dark gray
8. Connections: plugs/terminals
9. Mounting Box: (not included) 4x4 electrical
10. Fan Relay: 5 A, 240 VAC, pilot duty, SPDT, latching or non-latching

11. Fan Relay Actuation: selectable at “dIS” (disabled), 15 ppm, 25 ppm, 35 ppm (default), 50 ppm or 100 ppm
12. Fan Delay Settings: 0, 1, 3 (default), 5 and 10 minutes
13. Fan Relay Minimum Runtime Settings: 0 (default), 3, 5, 10 or 15 minutes
14. Alarm Relay: 0.5A 120 V, 60 VA
15. Alarm Relay Actuation: selectable N.O. default or N.C.
16. Alarm Relay Settings: dIS, 50 ppm, 100 ppm, 150 ppm and 200 ppm (default)
17. Current Loop: 4-20 mA for 0-200 ppm
18. Operating Environment: 0°F to 125° F (-18°C to 52°C),10 to 90% RH non-condensing
19. Macuro: CM-6

F. Intelligent 135 Degree Fixed Temperature / Rate of Rise Heat Detector
1. Where called for on the contract drawings, provide intelligent combination fixed temperature/rate-of-rise heat detectors at the locations shown on the drawings. The heat detector shall have a low mass thermistor heat sensor and operate at a fixed temperature and at a temperature rate-of-rise. It shall continually monitor the temperature of the air in its surroundings to minimize thermal lag to the time required to process an alarm. The integral microprocessor shall determine if an alarm condition exists and initiate an alarm based on the analysis of the data. Systems using central intelligence for alarm decisions shall not be acceptable. The intelligent heat detector shall have a nominal fixed temperature alarm point rating of 135oF (57oC) and a rate-of-rise alarm point of 15oF (9oC) per minute. The heat detector shall be rated for ceiling installation at a minimum of 70 ft (21.3m) centers and be suitable for wall mount applications.
2. Provide EDWARDS-KIDDE, model SIGA2-HRS.

G. Fixed Temperature Heat Detector
1. Where called for on the contract drawings, provide intelligent fixed temperature heat detectors at the locations shown on the drawings. The heat detector shall have a low mass thermistor heat sensor and operate at a fixed temperature. It shall continually monitor the temperature of the air in its surroundings to minimize thermal lag to the time required to process an alarm. The integral microprocessor shall determine if an alarm condition exists and initiate an alarm based on the analysis of the data. Systems using central intelligence for alarm decisions shall not be acceptable. The heat detector shall have a nominal alarm point rating of 135oF (57oC). The heat detector shall be rated for ceiling installation at a minimum of 70 ft (21.3m) centers and be suitable for wall mount applications.
2. Provide EDWARDS-KIDDE, model SIGA2-HFS.

H. Intelligent Multi-Sensor Detectors Types (where called for on the contract drawings)
1. Multi-criteria sensor can be any combination of photoelectrical smoke sensing, heat and carbon monoxide (CO) detection. The combined photoelectric smoke detection/heat/CO module shall have separate sensors that adjust the detection profile in response to the input from the sensors.
    a. Provide EDWARDS-KIDDE, model SIGA2-PHCOS
2. Multi-criteria detector can be combination of photoelectrical smoke sensing and carbon monoxide (CO) detection.
    a. Provide EDWARDS-KIDDE, model SIGA2-PCOS
3. Multi-criteria detector can be combination of fix-temperature heat and carbon monoxide (CO) detection.
    a. Provide EDWARDS-KIDDE, model SIGA2-HCOS
    b. All the Multi-Sensor detector shall use only one address on the SLC.

4. The CO activation shall be programmable type as follows: Alarm, Supervisory Latching, Supervisory Non-Latching, Monitor Latching, or Monitory Non-Latching.

I. Detector Base Types
   1. Provide standard detector mounting bases suitable for mounting on 1-gang, or 4inch octagon box and 4 inch square box. The base shall, contain no electronics and support all series detector types. Bases with electronics or dip-switches are not acceptable.
      a. Provide EDWARDS-KIDDE, model SIGA-SB4.
   2. Provide relay detector mounting bases suitable for mounting on 1-gang, or 4" octagon box and 4" square box. The relay base shall support all Signature Series detector types and have the following minimum requirements:
      a. The relay shall be a bi-stable type and selectable for normally open or normally closed operation.
      b. The position of the contact shall be supervised.
      c. The relay shall automatically de-energize when a detector is removed.
      d. The operation of the relay base shall be controlled by its respective detector processor or under program control as required by the application. Detector relays not capable of operational programming independent of the detector shall not be considered equal. Form "C" Relay contacts shall have a minimum rating of 1 amp @ 30 Vdc and be listed for "pilot duty".
      e. Removal of the respective detector shall not affect communications with other detectors.
      f. Provide EDWARDS-KIDDE, model SIGA-RB4
   3. Provide audible detector mounting bases suitable for mounting on 4" x 4" octagonal concrete ring (mud box) and 4" square x 2-1/8" (54 mm) deep box.
      a. The base shall support all Signature Series detector types and be capable of single or group operation. The audible base shall emit a temporal alarm tone and be selectable for low or high output.
      b. The operation of the audible base shall be controlled by its respective detector processor or under program control as required by the application. Detector audible base not capable of operational programming independent of the detector shall not be considered equal.
      c. The audible bases shall be UL268 and UL464 Listed, and provide a reverberant room sound output per UL464 of 81 dBA at 10ft (3m) and an average anechoic sound output of 90 dBA at 10 ft (3m).
      d. Provide EDWARDS-KIDDE, model SIGA-AB4G.

J. Audible Base - 520hz Low Frequency - Sleeping Room Occupancies
   1. Provide low frequency 520hz audible detector mounting bases suitable for mounting on 4" square x 2-1/8" (54 mm) deep box. The audible base shall produce tone sound within the frequency range of 520 Hz ±10% square wave tone.
   2. The operation of the audible base shall be controlled by its respective detector processor or under program control as required by the application. The base shall support all Signature Series detector types and be capable of single or group operation. The audible base shall emit a temporal 3 alarm tone and/or temporal 4 tone.
      a. The audible bases shall be UL268 and UL464 Listed, and nominal sound level shall be 87dBA in anechoic chamber and 80 dBA in reverberant room, listed.
      b. All low frequency sounder bases audible temporal 3 tone shall be synchronized through the facility. Including with building audible horns.

c. Provide EDWARDS-KIDDE, model SIGA-AB4G-LF.

K. Intelligent Duct Smoke Detector - Photoelectric

1. Provide intelligent photoelectric duct smoke detector at the locations shown on the drawings.
   a. One form C auxiliary alarm relay rated at 2amps @ 30Vdc.
   b. The operating range shall be 100ft/min to 4,000ft/min air velocity and temperature range of -20 to 158F.
   c. Sample tube can be installed with or without the cover place and be rotated in 45-degree increments to ensure proper alignment with duct airflow.
   d. Local magnet-activated test switch.
   e. Provide EDWARDS-KIDDE, model SIGA-SD
2. Provide remote test station with Alarm LED and Key Switch.
   a. Provide EDWARDS-KIDDE, model SD-TRK.
3. Relay Fan Shutdown: Rated to interrupt fan motor control circuit. Furnish and install separate device for each motor start. Connect to motor start as required for fan shutdown during alarm condition.
   a. Provide EDWARDS-KIDDE, model SIGA-CR.

L. Beam Smoke Detectors

1. Where called for on the contract drawings, provide reflective beam type smoke detectors. This detector shall consist of an integrated transmitter and receiver capable of being powered separately or together.
2. The detector shall operate in either a short range of 15 to 160 ft. or a long range of 160 to 330 ft. The detector shall feature a bank of alignment LEDs on both the receiver and transmitter to ensure proper alignment without the use of special tools.
3. The detector shall utilize an automatic gain control to compensate for gradual signal deterioration from dirt accumulation on lenses. The beam smoke detectors shall be powered from the system control panel. Testing shall be carried out using calibrated test filters.
4. Provide a remote key activated remote test station.
   a. Provide Edwards EDWARDS-KIDDE Beam Smoke Detector, model EC-50R or EC-100R with EC-LLT Test Station.

2.08 INTELLIGENT MODULES

A. It shall be possible to address each intelligent module without the use of DIP or rotary switches. Devices using switches for addressing shall not be acceptable. The personality of multifunction modules shall be programmable at site to suit conditions and may be changed at any time using a personality code downloaded from the Analog Loop Controller.

1. Integral Microprocessor: All decisions are made at the module determining if the device is alarm or trouble condition.
2. Non-Volatile Memory: Permanently stores serial number, and type of device. Automatically updates historic information including hours of operation, number of alarms and troubles, time of last alarm.
3. Automatic Device Mapping: Each detector transmits wiring information regarding its location with respect to other devices on the circuit, creating an As-Built wiring diagram. This will also provide enhanced supervision of the device physical location. The device message shall reside with the location and not the device address. Devices installed in the wrong location will always report the correct message of the physical location.

4. Twin Status LEDs: The modules shall have a minimum of 2 diagnostic LEDs mounted behind a finished cover plate. A green LED shall flash to confirm communication with the loop controller. A red LED shall flash to display alarm status.
5. Input and output circuit wiring shall be supervised for open and ground faults.
6. Two styles of modules shall be available, those designed for gang box mounting, and where multiple modules are required in a single location, plug in modules shall be provided with a Universal Input/Output motherboard.

B. Intelligent Input Module. The Input Module shall provide one or two supervised Class B input circuit capable of a minimum of 4 personalities, each with a distinct operation. The module shall be suitable for mounting on North American 2 ½" (64mm) deep 1-gang boxes and 1 ½" (38mm) deep 4" square boxes with 1-gang covers. The single input module shall support the following circuit types:
1. Normally-Open Alarm Latching (Manual Stations, Heat Detectors, etc.)
2. Normally-Open Alarm Delayed Latching (Waterflow Switches)
3. Normally-Open Active Non-Latching (Monitor, Fans, Dampers, Doors, etc.)
4. Normally-Open Active Latching (Supervisory, Tamper Switches)
5. Provide EDWARDS-KIDDE model SIGA-CT1 or CT2 or SIGA-MCT2

C. Intelligent Relay Module. Provide addressable control relay circuit modules shall provide one (1) form C dry relay contacts rated at 24Vdc @ 2 amps (pilot duty) to control external appliances or equipment. The position of the relay contact shall be confirmed by the system firmware. The module shall be suitable for mounting on North American 2 ½" (64mm) deep 1-gang boxes and 1 ½" (38mm) deep 4" square boxes with 1-gang covers.
1. Provide EDWARDS-KIDDE, model SIGA-CR or SIGA-MCR.

D. Intelligent High Current Relay Module. Provide addressable control relay circuit modules shall provide two (2) form C dry relay contacts rated at 24Vdc @ 7 amps (pilot duty) to control external appliances or equipment. The position of the relay contact shall be confirmed by the system firmware. The module shall be suitable for mounting on North American deep 4-inch square.
1. Provide EDWARDS, model SIGA-CRH

E. NAC Control Module: Provide intelligent NAC control module shall provide one (1) supervised Class B output circuit capable of a minimum of 2 personalities, each with a distinct operation. The gang box -mounted version shall be suitable for mounting in North American 2 ½" (64mm) deep 2-gang boxes and 1 ½" (38mm) deep 4" square boxes with 2-gang covers, or European 100mm square boxes. The plug-In version shall plug into a universal multi-module motherboard. The NAC control module shall support the following operations:
1. 24volt NAC circuit
2. Audio notification circuit 25v or 70v
3. Telephone Power Selector with Ring Tone (Firefighter's Telephone)
4. Visual Synchronized Output to Genesis appliances or to NAC Power Supply.
5. Provide EDWARDS-KIDDE, model SIGA-CC1 or -CC1S or SIGA-MCC1 or MCC1S.

F. Sounder Base Tone Control Module: Provide intelligent temporal pattern generator is an addressable device that generates sound patterns for fire (Temporal 3) or carbon monoxide (Temporal 4) to sounder bases. The module shall be suitable for mounting on North American 2 ½" (64mm) deep 1-gang boxes and 1 ½" (38mm) deep 4" square boxes with 1-gang covers. NAC control module shall support the following operations:
1. 24volt NAC circuit
2. Synchronized audible tone to all sounder bases and building audibles.

3. Alarm signal continues until the system resets or is manually silenced from the control panel.
4. Visual Synchronized Output to Genesis appliances or to NAC Power Supply.
5. Provide EDWARDS, model SIGA-TCDR

G. FA Elevator Interface Cabinet
1. Provide red metal cabinet enclosure with word FIRE in white letters on the cover. Inside will be four intelligent relays (Primary Recall, Alternate Recall, Fire Hat and Shunt Trip), one monitor input (Shunt Trip AC Power Supervision) and 120vac relay (Shunt Trip AC Power Supv).
2. Label all the relays and input modules for the function.
3. Provide EDWARDS-KIDDE, model MFC with SIGA-UIO6, -MCR, MCT2 and MR-101.

2.09 MANUAL FIRE-ALARM BOXES

A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.

B. Double-action mechanism requiring two actions to initiate an alarm, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
1. The manual pull station will have an intelligent module integral of the unit.
2. Station Reset: key operated switch shall match the control panel key.
3. Manual pull stations that initiated an alarm condition by opening the unit are not acceptable.
4. Provide EDWARDS-KIDDE, model SIGA-278.

C. Indoor Protective Shield “Stopper Covers”: Factory-fabricated clear plastic enclosure. Hinged at the top to permit lifting for access to initiate alarm. Lifting the cover actuates an integral battery powered audible horn (when noted on the drawings) intended to discourage false-alarm operation.
1. Weatherproof Locations: Where shown on the drawings, a weatherproof manual pull station shall be provided of red metal construction with special weatherproof gasket metal red box.
2. Single-action operation.
3. Station Reset: key operated switch shall match the control panel key.
4. The intelligent monitor module will be located within the building and not with the station
5. Provide EDWARDS-KIDDE, model MPSR1.

2.10 EMERGENCY MESSAGE SWITCHES

A. STI Stopper Station Series
B. Custom text to be determined
C. All buttons to be unique colors other than red
D. Surface or recessed as required
E. Shield without horn
F. Momentary switch

2.11 NOTIFICATION APPLIANCES

A. All appliances shall be of the same manufacturer as the Fire Alarm Control Panel specified to insure absolute compatibility between the appliances and the control panels, and to insure that the application of the appliances are done in accordance with the single manufacturers' instructions.

B. Any appliances, which do not meet the above requirements, and are submitted, for use must show written proof of their compatibility for the purpose intended. Such proof shall be in the form of documentation from all manufacturers which clearly states that their equipment (as submitted) are 100% compatible with each other for the purposes intended. All appliances shall be UL 1971, UL 1638 and UL 464 listed for Fire Protective Service. Speakers hall also be UL 1480F listed. Combination Speaker-Visual appliances may be used where shown on the contract drawings and standalone Visual Strobes and Speaker-Only devices may be used where shown on the contract drawings provided they meet the performance requirements specified herein for both audible and visual notification.

C. Notification Appliances - Visual (ALERT - Mass Notification)

1. Provide wall or ceiling mounted clear colored lens strobe with white body and "ALERT" markings. Clear strobe shall provide a smooth light distribution pattern field selectable candela 15 cd, 30 cd, 75 cd, and 110 cd flash output rating UL1638 listed, with in-out screw terminals shall be provided for wiring. The strobe (A, B, C, D) candela rating shall be view from the side window to verify the setting. All strobes shall be synchronization to within 10 milliseconds for an indefinite period shall not require the use of separately installed remote synch modules. The strobes shall mount to electrical box.
2. The device shall have plastic protective cover for during installation.
3. **All visual devices shall be Genesis LED type with lens colors as indicated on drawings. Basic lens color shall be Clear, Red, Blue or Amber as noted. Clear unless otherwise noted.**

D. Notification Appliances – Wall Colored Visual LED – Expander Plate

1. Provide expander plate with color LED Visual low profile that can house a second speaker strobe appliance at the locations shown on the drawings.
2. All visual led strobes shall be synchronization to within 2 milliseconds for an indefinite period.
3. The selected model with colored LED visuals shall be UL1638 listed; Red (15cd), Blue (30cd), Green (65cd) and Amber (75cd) with ALERT wording on the appliance.
4. The maximum current load shall be 0.036ma FWR.
5. Provide EDWARDS, model Genesis G4E Series device

E. Notification Appliance - High Fidelity Speaker

1. High Fidelity Speakers shall have a 4" Mylar/paper cone. The rear of the speakers shall be completely sealed protecting the cone during and after installation. In and out screw terminals shall be provided for wiring. Speakers shall provide 1/4w, 1/2w, 1w, and 2w power taps for use with 70V systems. The actual speaker wattage & strobe candela setting shall be view from the device window to verify the wattage setting, without removing the device. To make any changes to the speaker wattage will only require the removal of the cover plate.
2. High Fidelity Speaker listed frequency response of 400 to 4,000 Hz and listed sound output of 90.5 dBA at 10 feet, as measured in reverberation room per UL-1480. Speaker shall be listed in compliance to produce 520Hz low frequency tone signal.
3. Furnish devices with the following selectable minimum sound level output:

a. 1/4watt - 81.5 dBA
b. ½ watt - 84.1 dBA
c. 1 watt - 87.3 dBA
d. 2 watt - 90.5 dBA

4. Device shall be labeled "Alert"
5. Box shall be White
6. Provide EDWARDS-KIDDE, model Genesis G4HF & GCHF Series devices.

F. Notification Appliance - Re-entrant Speakers Mechanical, Storage and Unfinished Ceiling locations

1. Provide 4 inch diameter red white re-entrant speakers at loud ambient locations or for outdoor weatherproof installation. Weatherproof boxes shall be provided for outdoor mounting. Speakers shall provide 2w, 4w, 8w, and 15w power taps. The re-entrant speakers shall utilize a high-efficiency compression driver. Cone type drivers are not acceptable. At the 15 watt setting, the speaker shall provide a 102 dBA sound output over a frequency range of 400-4000 Hz. when measured in reverberation room per UL-1480.
2. Combination speaker strobes shall meet both sections of above.
3. Box shall be White
4. Lens Marking shall be "Alert"
5. Provide EDWARDS-KIDDE, model 757 Series devices.

G. Loudspeaker Gymnasium or High Ceiling Locations

1. Voice paging and tone signaling loudspeaker shall be Ultra Electronics Model _____ (see Model numbers above). Unit shall be UL1480-F Listed and Class I Division 2 certified, weather resistant and constructed of rugged 5VA rated, UVresistant ABS plastic. The loudspeaker shall be able to operate within any ambient temperature environment rangingfrom -40°C to 60°C. The speaker shall have a sensitivity of 112dB when measured at 1m (AVG 400-4,000Hz) and a beamwidth of 90° (-6dB at 1kHz). Model shall be a non-re-entrant compression loaded transducer with a 3” polymidediaphragm and power handling of 45W continuous. The coil shall be a nominal 8 ohm impedance and ferro-fluidshall surround the coil to optimize heat dissipation. When applicable, transformer power settings shall be selectableand include 100V: 45W, 32W, 24W, 16W, 8W; 70V: 24W, 16W, 12W, 8W, 4W; 25V: 3W, 2W, 1.5W, 1W, 0.5W. Speaker shallcontain in-line capacitor to allow DC supervision of wiring and be supplied with three feet of conduit with flying leads.Frequency response shall be 375Hz – 15kHz. Dimensions shall be 10.1”H x 10.1”W x 11.3”D.
2. HyperSpikeTCPA-10
3. UL Certified
4. Color per architect
5. Configuration as requried
6. Distributed audio voltage as required
7. Accessories as required

2.12 GUARDS FOR PHYSICAL PROTECTION

A. Provide welded mesh of size and shape for the manual pull stations, smoke detectors, notification appliances at location noted on the drawings.

2.13 MAGNETIC DOOR HOLDERS

A. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching doorplate.
   1. Electromagnet: Requires no more than 3 W to develop 25-lbf holding force.
   2. Wall-Mounted Units: Flush mounted unless otherwise indicated.
   3. Rating: 120-V ac, 24-V ac or dc.
   4. Provide EDWARDS-KIDDE, model 1500 series or DH Series.
   5. Coordinate Magnetic Hold opens with the General Trades and Door Hardware Contractors.

2.14 INSPECTION BAR CODES

A. Company shall provide a web-based reporting system for creating, updating and maintaining all service work, inspections, and maintenance performed as part of this specification to Inspection bar codes shall be installed on all initiating devices, annunciators, control panels and power supplies.
B. Inspection bar codes used by the system must utilize Code 3 of 9 or other approved format, and contain a minimum of eight (8) digits that comprise a unique serial identifier within the Web-based Reporting System. There shall be no duplication of serial numbers. Serial number shall be printed below the bar code for identification purposes.
C. Inspection bar codes shall be limited in size to no more than 2 inches in width, and 3/8 inches in height and shall include a Mylar or other protective coating to protect the bar code from fading due to sunlight or exposure.
D. Inspection bar codes shall be installed on each device in such a manner as to require that scanning of the bar code take place no further than 12 inches from the device during inspection.

2.15 INDICATING DEVICES

A. General: Equip alarm notification appliances for mounting as indicated. Provide terminal blocks for system connections. Device shall be U.L. 1971 listed.
B. Fire Alarm Horns: Electric vibrating polarized type, operating on 24 VDC, with provision for housing the operating mechanism behind a grille. Horns produce a sound pressure level of 87dB, measured 10 feet from the source.
C. Visual Notification Appliances: Flash rate shall be 1 flash per second with a 15/75 candela flash intensity or as marked on drawing, xenon flash output, 24 VDC operation, wall mounted, compatible with ADA requirements with the word "FIRE" clearly visible.
D. Combination notification appliances consist of factory combined, audible and visual notification units in a single mounting assembly.
E. Visual devices within entire facility shall have synchronizing flash rates.
   1. It shall be permissible to synchronize visual devices based upon logical building segments. Each segment shall be visually independent from one another. Submittal documents shall contain graphical description of synchronization scheme.

2.16 EMERGENCY POWER SUPPLY

A. General: Components include battery, charger, and an automatic transfer switch.
B. Battery: Sealed lead-acid type. Provide sufficient capacity to operate the complete alarm system in normal or supervisory (non-alarm) mode for a period of 60 hours. Following this period of operation on battery power, the battery shall have sufficient capacity to operate all components

of the system, including all notification appliances in alarm or supervisory mode for a period of 15 minutes.

C. Magnetic door holders are not served by emergency battery power. Magnetic door holders are released after 15 seconds when normal power fails.

2.17 FIRE ALARM CONDUIT, WIRE, AND BOXES

A. Conduit:
   1. Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements and as described elsewhere in this specification.
   2. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.
   3. Cable must be separated from any open conductors of power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, per NEC Article 760-29.
   4. Wiring for 24 volt DC control, alarm notification, emergency communication and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.
   5. Conduit shall not enter the fire alarm control panel, or any other remotely mounted control panel equipment or backboxes, except where conduit entry is specified by the FACP manufacturer.
   6. Contractor shall be responsible for satisfying all conduit fill requirements. Conduit cross sectional conductor fill shall not exceed 40% under any circumstances.

B. Terminal Boxes, Junction Boxes and Cabinets:
   1. All boxes and cabinets shall be UL listed for their use and purpose. All junction boxes shall be painted red.
   2. Initiating circuits shall be arranged to serve like categories (manual, smoke, waterflow). Mixed category circuitry shall not be permitted except on signaling line circuits connected to intelligent reporting devices.

2.18 WIRE AND CABLE

A. Signaling Line Circuits - Network Data: Twisted pair, not less than No. 16 AWG or as recommended by the manufacturer. Systems which use Shielded Wire requiring continuous foil shields and continuous drain wires are not acceptable, as they may lead to multiple ground faults and communication integrity faults.

B. Signaling Line Circuits - Intelligent Loop: Non-Twisted pair, not less than No. 16 AWG or as recommended by the manufacturer. Systems which use Shielded Wire requiring continuous foil shields and continuous drain wires are not acceptable, as they may lead to multiple ground faults and communication integrity faults.
   1. Circuit Integrity Cable: Provide as required to meet NFPA or Local Code requirements for any required pathway survivability.
   2. CI Cable shall meet article 760, power limited fire alarm service.

C. Notification Appliance Circuits -
   1. Audio: Twisted pair, not less than No. 16 AWG or as recommended by the manufacturer.
   2. Visual. Non-Twisted pair, not less than No. 14 AWG or as recommended by the manufacturer and required by the voltage drop calculations (it may be No. 12 AWG in some cases).

2.19 FIRE ALARM DOCUMENTS CABINET

A. Space Age Electronics, Inc.
B. Red fire alarm storage cabinet
C. 16 gauge steel construction
D. Textured, baked on enamel finish
E. Stainless steel piano hinge with CAT 30 keyed door lock
F. 4GB digital flash drive with USB B connector
G. Business card holder and two key ring hooks
H. Legend sheet for passwords and system information

2.20

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Provide Architectural outline of building per floor/level in stainless steel frame noting the location of all existing and new zones. Frame will have a clear Plexiglas front and will show a floor plan of the building with all pertinent informaiton. The floor plan will be computer generated. This contractor will be responsible for accurately verifying all information on architectural outline. Install building outline near existing fire alarm annunciator panels and control panel (min. 3 total).
B. Detectors shall not be installed before final clean-up by all trades is complete and final except where required by the authority having jurisdiction for protection during construction.
C. Detectors that are installed before final clean-up by all trades have to be throughly cleaned by manufacturer's representative or replaced.
D. Manufacture provided covers are not acceptable for use as "protective devices" during construction.
E. Where the AHJ requires early installation of detectors, the contractor shall be responsible for having the devices throughly cleaned by a manufacture's representative or replaced.
F. Fire Alarm Power Supply Disconnect: Shall be painted red and labeled "FIRE ALARM. " Provide with a lockable handle or cover.
G. Manual Pull Stations: Mount semi-flush in recessed back boxes with operating handles 48 inches above finished floor or as indicated.
H. Water-Flow Detectors and Valve Supervisory Switches: Connect for each sprinkler valve station required to be supervised.
I. Audible Notification Appliances: Install not less than 80 inches above the finished floor nor less than 6 inches below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille or as indicated. Combine audible and visual notification appliances at the same location into a single unit.
J. Visual Notification Appliances: Install adjacent to each alarm bell or alarm horn and not less than 80 inches above the finished floor and at least 6 inches below the ceiling.
K. Device Location-Indicating Lights: Locate in the public space immediately adjacent to the device they monitor.
L. All initiating and/or indicating devices installed within gymnasium shall include protective heavy duty wireguards.
M. EQUIPMENT INSTALLATION

1. Comply with NFPA 72 and NEC Article 760 for installation of fire-alarm equipment.
2. Equipment Mounting: Install fire-alarm control unit on finished floor with tops of cabinets not more than 72 inches above the finished floor.
3. Smoke- or Heat-Detector Spacing:
    a. Comply with NFPA72, "Smoke-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for smoke-detector spacing.
    b. Comply with NFPA72, "Heat-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for heat-detector spacing.
    c. Smooth ceiling spacing shall not exceed 30 feet.
    d. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Appendix A [or Appendix B] in NFPA 72.
    e. HVAC: Locate detectors not closer than 5 feet from air-supply diffuser or return-air opening.
    f. Lighting Fixtures: Locate detectors not closer than 12 inches from any part of a lighting fixture.
4. Duct Smoke Detectors: Comply with NFPA72 and NFPA 90A. Install sampling tubes so they extend the full width of duct.
5. Heat Detectors in Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location.
6. Single-Station Smoke Detectors: Where more than one smoke alarm is installed within a dwelling or suite, they shall be connected so that the operation of any smoke alarm causes the alarm in all smoke alarms to sound.
7. Notification Appliance Devices: Install between 80 and 96 inches on the wall, consult applicable NFPA 72 Chapter for specific mounting heights of Visual Strobes, Audible Devices and Combinations Audible/Visual Devices.
8. Fire-Alarm Control Unit: Surface mounted, with tops of cabinets not more than 72 inches above the finished floor.
9. Remote Annunciator or Local Operator Console: Install with top of panel not more than 56 inches above the finished floor.

3.02 CONNECTIONS

A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Division 8 Section "Door Hardware." Connect hardware and devices to fire-alarm system.
    1. Verify that hardware and devices are NRTL listed for use with fire-alarm system in this Section before making connections.
B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 3 feet from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
    1. Alarm-initiating connection to smoke-control system (smoke management) at firefighter smoke-control system panel.
        a. Alarm-initiating connection to stairwell and elevator-shaft pressurization systems.
        b. Smoke dampers in air ducts of designated air-conditioning duct systems.
        c. Alarm-initiating connection to elevator recall system and components.
        d. Alarm-initiating connection to activate emergency lighting control.

e. Alarm-initiating connection to activate emergency shutoffs for gas and fuel supplies.
f. Supervisory connections at valve supervisory switches.
g. Supervisory connections at low-air-pressure switch of each dry-pipe sprinkler system.
h. Supervisory connections at elevator shunt trip breaker.
i. Supervisory connections at fire-pump power failure including a dead-phase or phase-reversal condition.
j. Supervisory connections at fire-pump engine control panel.

3.03 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 16 Section "Electrical Identification."
B. Install framed instructions provided by Fire Alarm Distributor in a location visible from fire-alarm control unit.
C. All initiating devices shall have bar code label installed visibly on the device. This bar code shall be used for digital inspection of the fire alarm system using Building Reports.Com.

3.04 WIRING INSTALLATION (PARTIAL METALLIC CONDUIT SYSTEM)

A. In general, furnish and install all fire alarm system wiring within EMT conduit or surface mounted metallic raceway (Wiremold - Ivory only). The only allowable exception to the metallic raceway (EMT or Wiremold) requirement is above lay-in ceilings. There, approved plenum rated "Fire Wire" may be used.
B. This contractor may reuse existing, approved (EMT & Metallic surface raceway only), conduit; however, this contractor will be responsible for ensuring that entire fire alarm wiring system is installed within approved conduit and install new as necessary. Greenfield is expressly forbidden. Where existing Greenfield raceway is found, it will be this contractors responsibility to remove and replace with approved metallic raceway. Contractor shall throughly review existing field conditions to verify existence of unapproved raceway and include appropriate amount in base bid. No extras will be allowed for the replacement of existing, substandard raceway. Electrical Contractor shall check and be responsible for actual installation with regard to available conduit spaces provided and shall cooperate with other trades.
C. Wiring Method: Install wiring in metal raceway according to Division 16 Section "Raceways. " Conceal raceway except in unfinished spaces and as indicated.
D. Wiring Within Enclosures: Install conductors parallel with or at right angles to the sides and back of the enclosure. Bundle, lace, and train the conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the wiring diagrams of the system. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.
E. Cable Taps: Use numbered terminal strips in junction, pull or outlet boxes, cabinets, or equipment enclosures where any circuit tap is made.
F. System Wiring: Wire and cable shall be a type listed for its intended use by an approval agency acceptable to the Authority Having Jurisdiction (AHJ) and shall be installed in accordance with the appropriate articles from the current approved edition of the National Electric Code (NEC)(NFPA 70). It is the Contractor's responsibility to obtain from the Fire Alarm System Manufacturer written instruction regarding the appropriate wire/cable to be used for this installation. No deviation from the written instruction shall be made by the Contractor without the prior written approval of the Fire Alarm System Manufacturer.

G. Color Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color code for alarm initiating device circuits wiring and a different color code for supervisory circuits. Color-code notification appliance circuits differently from alarm-initiating circuits. Paint fire alarm system junction boxes and covers red.

H. Fan Shutdown: Air handling equipment shall be connected to relays in its' respective duct smoke detector.

I. Wiring to Central Station Transmitter: 1-inch conduit between the FACU and the central station connection as indicated. Install number of conductors and electrical supervision for connecting wiring as required to suit central-station monitoring function. Final connections to terminals in central station equipment are made under this contract.

3.05 GROUNDING

A. A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

3.06 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Provide services of a factory-authorized service representative to supervise the field assembly and connection of components and the pretesting, testing, and adjustment of the system.

B. Pretesting: Upon completing installation of the system, align, adjust, and balance the system and perform complete pretesting. Determine, through pretesting, the conformance of the system to the requirements of the Drawings and Specifications. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new and retest until satisfactory performance and conditions are achieved. Prepare forms for systematic recording of acceptance test results.

C. Report of Pretesting: After pretesting is complete, provide a letter certifying the installation is complete and fully operable, including the names and titles of the witnesses to the preliminary tests.

D. Final Test Notice: Provide a 10-day minimum notice in writing when the system is ready for final acceptance testing.

E. Testing Procedures

1. Detailed test procedures, prepared and signed by a Registered Professional Engineer or a NICET Level 4 Fire Alarm Technician, and signed by representative of the installing company, for the fire detection and alarm system 60 days prior to performing system tests. Detailed test procedures shall list all components of the installed system such as initiating devices and circuits, notification appliances and circuits, signaling line devices and circuits, control devices/equipment, batteries, transmitting and receiving equipment, power sources/supply, annunciators, special hazard equipment, emergency communication equipment, interface equipment, Guard's Tour equipment, and transient (surge) suppressors. Test procedures shall include sequence of testing, time estimate for each test, and sample test data forms. The test data forms shall be in a check-off format (pass/fail with space to add applicable test data) and shall be used for the preliminary testing and the acceptance testing. The test data forms shall record the test results and shall:
    a. Identify the NFPA Class and Style of all Initiating Device Circuits (IDC), Notification Appliance Circuits (NAC), Voice Notification System, and Signaling Line Circuits (SLC).
    b. Identify each test required by NFPA 72 Test Methods and required test herein to be performed on each component, and describe how this test shall be performed.

c. Identify each component and circuit as to type, location within the facility, and unique identity within the installed system. Provide necessary floor plan sheets showing each component location, test location, and alphanumeric identity.

d. Identify all test equipment and personnel required to perform each test (including equipment necessary for testing smoke detectors using real smoke).

e. Provide space to identify the date and time of each test. Provide space to identify the names and signatures of the individuals conducting and witnessing each test.

2. Tests Stages

a. Preliminary Testing: Conduct preliminary tests to ensure that devices and circuits are functioning properly. Tests shall meet the requirements of paragraph entitled "Minimum System Tests." After preliminary testing is complete, provide a letter certifying that the installation is complete and fully operable. The letter shall state that each initiating and indicating device was tested in place and functioned properly. The letter shall also state that panel functions were tested and operated properly. The letter shall include the names and titles of the witnesses to the preliminary tests. The Contractor and an authorized representative from each supplier of equipment shall be in attendance at the preliminary testing to make necessary adjustments.

b. Request for Formal Inspection and Tests: When tests have been completed and corrections made, submit a signed, dated certificate.

c. Final Testing: Notify the Contracting Officer in writing when the system is ready for final acceptance testing. Submit request for test at least 15 calendar days prior to the test date. The tests shall be performed in accordance with the approved test procedures in the presence of the Authority Having Jurisdiction (AHJ) . The Contractor l furnish instruments and personnel required for the tests. A final acceptance test will not be scheduled until the operation and maintenance (O&M) manuals are furnished to the Owner/Architect and the following are provided at the job site:

1) The systems manufacturer's technical representative

2) Marked-up red line drawings of the system as actually installed

3) Megger test results

4) Loop resistance test results

5) Complete program printout including input/output addresses

3. The final tests shall be witnessed by the Authority Having Jurisdiction (AHJ). At this time, any and all required tests shall be repeated at their discretion. Following acceptance of the system, as-built drawings and O&M manuals shall be delivered to the Contracting Officer for review and acceptance. In existing buildings, the transfer of devices from the existing system to the new system and the permission to begin demolition of the old fire alarm system will not be permitted until the as-built drawings and O&M manuals are received.

F. Minimum System Tests

1. Intelligibility Testing (refer to separate paragraph for the scope of this work).

2. Visual Inspection: Conduct visual inspection prior to testing.

a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.

b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA72; retain the "Initial/Reacceptance" column and list only the installed components.

3. System Testing: Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA72.
4. Audibility testing shall test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
5. Audibility testing shall test audible appliances for the private operating mode according to manufacturer's written instructions.
6. Test visible appliances for the public operating mode according to manufacturer's written instructions.
7. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA72.

G. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

H. Fire-alarm system will be considered defective if it does not pass tests and inspections.

I. Prepare test and inspection reports.

J. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.

K. Annual Test and Inspection: During the warranty period, each year test fire-alarm system complying with visual and testing inspection requirements in NFPA72. Use forms developed for initial tests and inspections.

L. Detector Sensitivity Testing: During the warranty period, each year the contractor is to perform detector sensitivity testing and provide report to the Owner. Unless, the system is UL Listed to perform automatic sensitivity testing without any manual intervention and should detector fall outside of sensitivity window, the system will automatically indicated a devices trouble. A copy of UL letter is to be provided as proof of system operation

M. Retesting: Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by the system test that the total system meets the Specifications and complies with applicable standards.

N. Report of Tests and Inspections: Provide a written record of inspections, tests, and detailed test results in the form of a test log. Submit log upon the satisfactory completion of tests.

O. Tag all equipment, stations, and other components at which tests have been satisfactorily completed.

P. Final Test, Certificate of Completion, and Certificate of Occupancy:
1. Test the system as required by the Authority Having Jurisdiction in order to obtain a certificate of occupancy. Demonstrate that the system meets the Specifications and complies with applicable standards. This final test shall be witnessed by a representative of the Authority Having Jurisdiction and a factory-authorized service representative.

3.07 FIRE ALARM DOCUMENTS CABINET

A. Furnish system program and password to owner. Program shall be stored in fire alarm documents USB flash drive.

B. Provide all manuals and record drawings (11x17) and store in documents cabinet.

C. Provide keys to all panels, NAC, annunciators, etc. and store in documents cabinet.

3.08 INTELLIGIBILITY TESTING AND ACOUSTICAL ADJUSTMENT

A. Installing Contractor and Fire Alarm Distributor Shall include in their bid all costs to provide two (2) full Intelligibility Tests of all Acoustically Distinguishable Spaces (ADS). Such tests shall be made and witnessed in the presence of the Owner and/or their designated representative.

B. Intelligibility testing of the System shall be accomplished in accordance with NFPA 72 for Voice Evacuation Systems, IEC 60268-16, and ASA S3.2.

1. Following are the specific requirements for intelligibility tests:
    a. Intelligibility Requirements: Verify intelligibility by measurement after installation.
    b. Ensure that a CIS value greater than the required minimum value is provided in each area where building occupants typically could be found. The minimum required value for CIS is 0.65.
    c. Areas of the building provided with hard wall and ceiling surfaces (such as metal or concrete) that are found to cause excessive sound reflections may be permitted to have a CIS score less than the minimum required value if approved by the AHJ installation, and if building occupants in these areas can determine that a voice signal is being broadcast and they must walk no more than 33 feet to find a location with at least the minimum required CIS value within the same area.
    d. Areas of the building where occupants are not expected to be normally present are permitted to have a CIS score less than the minimum required value if personnel can determine that a voice signal is being broadcast and they must walk no more than 50 feet to a location with at least the minimum required CIS value within the same area.
    e. Take measurements near the head level applicable for most personnel in the space under normal conditions (e.g., standing, sitting, sleeping, as appropriate).
    f. The distance the occupant must walk to the location meeting the minimum required CIS value shall be measured on the floor or other walking surface as follows:
        1) Along the centerline of the natural path of travel, starting from any point subject to occupancy with less than the minimum required CIS value.
        2) Curving around any corners or obstructions, with a 12 inches clearance there from.
        3) Terminating directly below the location where the minimum required CIS value has been obtained.
2. Use commercially available test instrumentation to measure intelligibility as specified by ISO 7240-19 and ISO 7240-16 as applicable. Use the mean value of at least three readings to compute the intelligibility score at each test location.
3. Record all intelligibility readings for the ADS in the web-based bar code inspection and testing software and affix barcode to the nearest audible notification appliance closes to the entrance or exit from the ADS.

C. Provide a preliminary report to the Owner and Owner's Representative for review. Include time for a review meeting to discuss the results and any areas for adjustments.

D. Provide one (1) full speaker tap setting adjustment to each notification appliance within the entire audible notification appliance network. Adjust speaker wattage tap settings up or down based upon the direction provided by the Owner's Representative. Do not adjust speaker tap settings for speakers or areas which are not determined to need adjustment.

E. Provide a second full Intelligibility Test and Final Intelligibility Report to the Owner and Owner's Representative for approval.

3.09 CLEANING AND ADJUSTING

A. Cleaning: Remove paint splatters and other spots, dirt, and debris. Touch up scratches and mars of finish to match original finish. Clean unit internally using methods and materials recommended by manufacturer.

B. Occupancy Adjustments: When requested within one year of date of Substantial Completion, provide on-site assistance in adjusting sound levels and adjusting controls and sensitivities to suit actual occupied conditions. Provide up to three visits to the site for this purpose.

3.10 SOFTWARE MODIFICATIONS

A. Provide the services of a factory trained and authorized technician to perform all system software modifications, upgrades or changes. Response time of the technician to the site shall not exceed 4 hours.

B. Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm system on site. Modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site. Modification of software shall not require power-down of the system or loss of system fire protection while modifications are being made.

3.11 INSTRUCTION MANUALS

A. The Contractor shall provide, in addition to one approved copy of the fire alarm system submittal, complete operating instructions; pertinent system orientation documents; and system service, testing, and alarm documentation in the fire control area for the Owner's and fire department's permanent use.

3.12 INSTRUCTION OF OWNER

A. Instructor

1. Include in the project the services of an instructor, who shall have received specific training from the manufacturer for the training of other persons regarding the inspection, testing, and maintenance of the system provided. The instructor shall train the school district employees designated by the district, in the care, adjustment, maintenance, and operation of the fire alarm and fire detection system.

B. Qualifications

1. Each instructor shall be thoroughly familiar with all parts of this installation. The instructor shall be trained in operating theory as well as in practical O&M work.

C. Required Instruction Time

1. Provide 16 hours of instruction after final acceptance of the system. The instruction shall be given during regular working hours on such dates and times as are selected by the Contracting Officer. The instruction may be divided into two or more periods at the discretion of the Contracting Officer. The training shall allow for rescheduling for unforeseen maintenance and/or fire department responses.
2. All training sessions shall be digitally recorded (video and audio) and DVD copies shall be provided to the owner.

3.13 LOCAL FIRE DEPARTMENT INSPECTION

A. In additional to instruction time, Provide time, as required, for fire department inspection assistance. The project forman shall complete the walk through with the local fire department

and provide information and assistance as requested. Contractor to include in Base Bid, pricing to perform all service calls required to pass inspections.

3.14 GUARANTEE

A. The electrical Contractor shall guarantee all wiring and terminal equipment to be free from inherent and mechanical defects due to workmanship and materials used for a period of two (2) years from date of local fire department acceptance.

B. The fire alarm manufacturer, and not distributor or electrical Contractor, shall furnish in writing a two (2) year warranty. Warranty shall list all equipment in the system and state that equipment to be free from inherent and mechanical defects due to workmanship and materials for a period of two (2) years from final local fire department acceptance.

C. Warranty service for the equipment shall be provided by the system supplier's factory trained representative. Emergency service provided 24 hours per day 7 days per week shall be available from the same source at no additional cost to the Owner during warranty period.

D. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two (2) years from date of Substantial Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.

   1. Provide 30 days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary.

E. The guarantee will cover entire systems (electronic components, wiring, software, peripheral devices, etc.). The guarantee will be structured such that any system malfunction during the first year from system initial acceptance will be completely repaired within a reasonable period at no additional cost in money or labor. In addition, this guarantee shall cover one annual cleaning and servicing of all equipment. At a minimum, the system servicing shall occur once during the period of this contract: end of 1st year. Service shall include a complete functional test and cleaning of all devices.

END OF SECTION

Cary Community Consolidated School District 26

Board of Education

Deanna Darling, President; Melinda Hartman, Vice-President; Julie Jette, Secretary

Memo

From: **Board of Education**

Date: **February 23, 2026**

Re: **Approval of New Superintendent Contract**

Recommendation

The Board of Education is recommending the employment of Dr. Sarah Cacciatore as the next Superintendent of Schools for Cary Community Consolidated School District 26 commencing July 1, 2026, through June 30, 2029, for a 3-year contract. Dr. Cacciatore is being recommended to replace Dr. Jennifer Thomas, as she ends her term as Interim Superintendent on June 30, 2026.

Interview Process

The approval of our new Superintendent is a culmination of a comprehensive search conducted by the Board with the assistance of the search firm, Hazard, Young & Attea (HYA). The search process included many hours of reviewing application materials, interviewing semi-finalist candidates, and carefully assessing the qualifications of candidates in relation to the candidate profile determined by the Board in conjunction with feedback received from the community survey and 14 community forums. The Board evaluated 12 applicants from a pool of 37 and interviewed 6 before narrowing the search to the 3 finalists. Following interviews with the three finalists, together with stakeholder feedback received, the Board made the decision to select Dr. Sarah Cacciatore as their next Superintendent effective July 1, 2026.

Education and Work Experience

Dr. Cacciatore comes to this position with highly qualifying credentials that include a Doctorate of Education in Curriculum Leadership from Northern Illinois University in 2016, an Ed.S. from Western Illinois University (2019), A Master of Arts in Education from Roosevelt University (2003) and a Bachelor of Arts in Biology from National Lois University (2000). Dr. Cacciatore has extensive educational experience as a middle school math and science teacher, a Curriculum & Assessment Coordinator, Director of Curriculum & Assessment, Assistant Superintendent for Teaching & Learning and Deputy Superintendent. Dr. Cacciatore started her career as a middle school teacher in Virginia, continuing her teaching in Illinois at Community Unit District 300 and Kaneland Community Unit School District 302. She transitioned to administration as the Curriculum & Assessment

Coordinator, then Director of Curriculum & Assessment preK-8 at Troy Community Consolidated School District 30-C in Plainfield. At Oak Gove School District 68, Dr. Cacciatore was the Director of Curriculum & Grant Coordinator, and then Assistant Superintendent for Curriculum & Instruction. Since 2021, she has served the Mundelein community, first as the Assistant Superintendent for Teaching & Learning in District 75 and most recently as the Deputy Superintendent for Mundelein High school District 120 and Elementary District 75

Recommendation
The Board of Education is recommending the approval of Dr. Sarah Cacciatore for the position of Superintendent of Cary Community Consolidated School District 26. If approved, Dr. Cacciatore will enter into a 12-month, 3-year contract at a salary of $200,000 that will begin July 1, 2026, and end June 30, 2029.

May I have a motion to approve Dr. Sarah Cacciatore as the next Superintendent of Cary Community Consolidated School District 26 commencing July 1, 2026, through June 30, 2029, for a 3-year contract as presented.

Dr. Sarah Cacciatore

"Great leaders don't set out to be a leader. They set out to make a difference. It's never about the role - always about the goal." - Lisa Haisha

VALUE TO THE ORGANIZATION

- Expert in systems approach to leadership and creating organizational structures
- Accomplished in adult learning theories to support effective and sustainable change
- Foster healthy working relationships with all stakeholders to ensure a culture of continued growth

LEADERSHIP EXPERIENCES

- Created an effective and productive Teaching & Learning Department through trust, communication, consistency, honesty, and follow through
- Coach principals in observing literacy classrooms and leading staff development in best practices for literacy instruction
- Lead professional development for continued success within a Blue Ribbon School District
- Mentor novice curriculum directors through Association for School Curriculum & Development (IL-ASCD) organization
- Created and co-hosted tri-county Standards Based Summit for teacher collaboration around evidence-based reporting in June 2018 and 2019

PROFESSIONAL EXPERIENCE

Mundelein Mundelein High School District 120 & Elementary District 75, Mundelein, IL

Deputy Superintendent 2023-Present

- Serve as the Superintendent's designee for District 75/120
- Facilitate the executive cabinet team to celebrate effectiveness, identify areas of growth and create action plans to improve administrator working relationships across both districts
- Engage in regular meetings with Human Resources, Business Office, Teaching & Learning, Operations and Maintenance, Student Services, and building principals to enhance organizational effectiveness
- Ensure decisions related to Fiance, Facilitates and Operations are for the betterment of the student experience at the district and community level
- Attend Lake County School Board dinners to understand how administrators can continue to support Board of Education members
- Created and implemented a D75 and D120 leadership cohort to support the development of internal candidates in future leadership roles
- Member of the MESA contract negotiation team
- Oversee prek-12 Teaching and Learning Department for vertical alignment
- Support the Associate Principal at Mundelein High School principal with building needs while principal is on leave
- Direct supervisor of all building principals K-12, executive cabinet members, as well as the D75 Teaching & Learning Department

Mundelein Elementary School District 75, Mundelein, IL

Assistant Superintendent for Teaching & Learning 2021-2023

- Served as the Superintendent's designee for District 75 and perform additional duties as assigned

- Co-facilitated with Union leadership, the implementation of the teacher evaluation process with the development of a handbook, as well as, instituted an organizational platform to better support evaluation documentation
- Collaborated with D75 Board of Education members to develop a comprehensive District Strategic Plan
- Planned and lead new teacher induction days and new teacher meetings throughout school year
- Led district wide professional learning for teachers and administrators in English Language Arts, assessment practices, feedback and the workshop model for instruction
- Created forward planning 5 year curriculum review cycle across preK-8 to ensure all content areas are reviewed regularly for best practices and continued improvement
- Developed a process to help support gifted placement review to include transparency for staff, parents and administrators
- Established a process to ensure SOPPA compliance across district and meeting legal requirements related to student data privacy
- Managed the Teaching and Learning local budget for fiscal responsibility and equity of support across all schools in District
- Articulated monthly with Assistant Superintendents in our feeder group: Fremont SD79, Diamond Lake SD76, Hawthorne SD73 and Mundelein HSD120
- Managed grants for Title I, II, IV, ESSER II and ESSER III
- Facilitated the work of the Equity Audit and created focus groups for staff and community members
- Member of the MEEA contract negotiation team
- Maintained relationships across multiple states within the Teaching & Learning community to ensure staying current and aware of trends in education outside of our community
- Encouraged the implementation of personalized professional learning plans based on Cycles of Inquiry process and staff input to ensure all School Improvement and Teacher Institute Days are effective and productive for all certified roles

Oak Grove School District 68, Green Oaks, IL

Assistant Superintendent for Curriculum & Instruction 2019-2021

- Continued all the responsibilities of the Director of Curriculum and Grant Coordinator while fulfilling all the roles of the Assistant Superintendent
- Served as the Superintendent's and Principal's designee and perform additional duties as assigned
- Evaluated and provided areas of continued improvement for building level administrators
- Led the implementation of the navigation and implementation of remote and in person school programming during the FY20 and FY21 school years
- Supported the development of the Strategic Plan and action plans for implementation
- Facilitated professional development that supported receiving a Blue Ribbon for Academic Achievement
- Presented at various parent engagement events throughout the school year
- Guided the three year rollout of a common Learning Management System across grades K-8
- Served on the Negotiation Team for Oak Grove Administration/ Board of Education

Director of Curriculum & Grant Coordinator, K-8 2014-2019

- Created monthly reports for the Board of Education and sat at Board table
- Served as the Building Principal's designee and performed additional duties as assigned
- Facilitated teacher appraisal committee and PERA implementation with administration and association representation
- Created and directed district-wide mentor/new certified staff program and new teacher orientation days
- Cultivated student teacher experiences for undergraduate students
- Developed and implemented 5 year plan to support standards-based grading and reporting practices district wide

- Led professional growth book study options and implemented small group book clubs for all certified staff
- Wrote Title I, II, and IV grants in addition to quarterly reports related to ISBE grants and design grant money distribution plan
- Transitioned district to workshop model for reading and writing instruction with teacher buy-in
- Facilitated K-8 science, math, reading, writing, health, Spanish, French, physical education, & Social Emotional Learning curriculum review cycles
- Created Talented And Gifted program guide, requirements, and data review procedures for math and English language arts, K-8
- Authored weekly articles for parent and community newsletters on topics such as state & district curriculum updates, grading and reporting practices, parenting tips, and testing information
- Coordinated the STAR 360 assessment system for math and reading district wide
- Supervised, mentored and evaluated instructional and technology coaches to provide embedded professional development aligned to district and school goals

Troy Community Consolidated School District 30-C, Plainfield, IL
Director of Curriculum & Assessment, preK-8 2013-2014
Curriculum & Assessment Coordinator, Grades 5-8 2010-2013

TEACHING ACCOMPLISHMENTS

I implemented best practices to support student learning and led colleagues in professional development. Leadership experiences while teaching include:

- Created and implemented science family fun night for students and families of students in K-8
- Mentored 12 undergraduate education students within the classroom setting through Northern Illinois University and 3 novice teachers
- Orchestrated building wide remediation program for Virginia State Testing with an $8,000 foundation grant
- Hired 8 teachers to prepare after school lessons in math and English in order to prepare at-risk students for standardized testing while still in teaching role
- Piloted new ESOL team teaching model and presented results for teachers across 26 middle schools

Kaneland Community Unit School District 302, Maple Park, IL 2007-2010
8th Grade Science Teacher, Kaneland High School & Harter Middle
Community Unit District 300, Algonquin, IL 2006-2007
7th Grade Science and Language Arts Teacher, Algonquin Middle School
Fairfax County Public Schools, Vienna, VA 2004-2006
7th & 8th Grade Science Teacher, 7th Grade Math Teacher, Joyce Kilmer Middle School
Spotsylvania County Public Schools, Fredericksburg, VA 2003-2004
8th Grade Science Teacher, Battlefield Middle School

PROFESSIONAL ACTIVITIES

- Illinois Association of School Personnel Administrators (IASPA) Member 2023-Present
- Illinois Association for School Curriculum and Development Faculty Member 2019-Present
- Aspiring Superintendent Academy participant July 2018
- Curriculum Leadership Development Network (CLDN), planning task force member 2017- Present
- K-12 Tech Forum: K-12 Technology Decision Makers, Board Member 2017- 2021
- Lake County Curriculum Directors Group 2016- 2023
- IL and National Association for School Curriculum and Development member 2011- Present

PRESENTATIONS & ARTICLES

- Grant Writing 101: Submitting grants as a Curriculum Leader, February 2024 & April 2024
- A Balanced Middle School Social Studies Curriculum that Prepares Students for the Uncertainty of Today and Tomorrow, ILASCD Fall 2022 Publication, pages 30-35
- Including Stakeholders in TAG Appeals, November 2018 & November 2019, Illinois Association of School Boards, Joint Annual Conference
- Transparent Student Identification Process, February 2018 & February 2019, Illinois Association for Gifted Children
- Supporting the Change Process, October 2016, Illinois Principals Association Conference
- 8 Mathematical Practices, Level 3 Presentation, June 2012, National Conference on College and Career Readiness
- Embedding the 8 Mathematical Practices, April 2012**,** Illinois Association for Supervision and Curriculum Development
- Common Core Mathematics Transition K-8, February 2012, No Child Left Behind Conference
- Putting PLC into Practice, November 2009, Illinois Science Teachers Association Conference

EDUCATION

- **Educational Specialist**, Western Illinois University, Grayslake, Illinois — May 2019
- **Doctorate of Education**, Northern Illinois University, DeKalb, Illinois — May 2016
  Curriculum Leadership, Area of Focus
- **Master of Arts** Education, Roosevelt University, Schaumburg, Illinois — May 2003
- **Bachelor of Arts**, National Louis University, Evanston, Illinois — March 2000
  Biology Major, Psychology and Physical Science Minors

CERTIFICATIONS: IEIN 363074 - Illinois

- Superintendent Endorsement (K-12)
- General Administrative Endorsement (K-12), Type 75
- Principal Evaluator Modules 1-5
- Professional Educator License (PEL)
- Elementary Education (K-9), Type 03

DISSERTATION

- "Examining K-8 teachers' perceptions of mandated curriculum change" March 2016, Northern Illinois University

VOLUNTEER EXPERIENCE

Girl Scout Leader for a group of 18 lively girls across grades 1-6 — 2018- Present

SUPERINTENDENT'S EMPLOYMENT CONTRACT

AGREEMENT made this ____ day of February 2026, between the **BOARD OF EDUCATION OF CARY COMMUNITY CONSOLIDATED SCHOOL DISTRICT NO. 26, McHENRY AND LAKE COUNTIES, ILLINOIS,** hereinafter referred to as the "Board," and Dr. Sarah Cacciatore, hereinafter referred to as the "Superintendent."

A. EMPLOYMENT AND COMPENSATION

1. **Salary and Term of Employment.** The Board hereby employs the Superintendent for a multiyear period of three (3) years, commencing on July 1, 2026, and terminating on June 30, 2029, at an annual salary of Two Hundred Thousand Dollars ($200,000) for the 2026-2027 school year, to be modified each subsequent year by the most recent Consumer Price Index used to determine the Property Tax Extension Limitation. Such annual salary modifications will be no less than two percent (2%) and no greater than five percent (5%) than the preceding contract year's salary.

A contract year under the terms of this Agreement shall be from July 1 through the following June 30th. The Superintendent's salary will be payable in equal installments in accordance with the rules of the Board governing payments of other administrative staff members in the District. The Superintendent accepts employment upon the terms and conditions set forth in this contract. In consideration of such compensation, the Superintendent hereby agrees to devote such time skill, labor and attention to their employment, during the term of this Agreement (except as otherwise provided in this Agreement), in order to faithfully perform the duties of Superintendent.

2. **Teachers' Retirement System and Health Insurance Security Fund.** In addition to the annual salary stated in paragraph A.1 and all other TRS creditable earnings within this contract, the Board shall pay on behalf of the Superintendent to the State of Illinois Teachers' Retirement System and the Teacher Health Insurance Security Fund the Superintendent's required contributions to said pension system and health fund. The Superintendent will not have any right or claim to said amounts, except as they may become available at the time of retirement or resignation from the State of Illinois Teachers' Retirement System and the Teacher Health Insurance Security Fund. Both parties acknowledge that the Superintendent did not have the option of choosing to receive the contributed amounts directly, instead of having such contributions paid by the Board to the Teachers' Retirement System and Teacher Health Insurance Security Fund, and further acknowledge that such contributions are made as a condition of employment to secure the Superintendent's future services, knowledge and experience.

B. CONDITIONS OF EMPLOYMENT

1. **License.** During the term of this contract, the Superintendent shall hold a valid and properly registered license issued by the State of Illinois Teachers' Licensure Board qualifying them to act as Superintendent of the School District.

2. **Waiver of Tenure.** The Superintendent acknowledges that, pursuant to the *School Code*, they waive any right to tenure in the School District only for the term of this multi-year contract and any multi-year extension thereof. Upon acceptance of this contract the Superintendent will not lose any previously acquired tenure credit with the District.

3. **Background Checks.** Pursuant to 105 ILCS 5/10-21.9, Boards of Education are prohibited from knowingly employing a person who has been convicted of committing or attempting to commit the named crimes therein. If the criminal background investigation required by Illinois law is not completed at the time this Agreement is signed, and the subsequent investigation report reveals there has been such a conviction, this Agreement shall immediately become null and void. The Superintendent further acknowledges that the continuation of this Contract is contingent on the Board deeming acceptable the results of periodic re-checks of the Statewide Sex Offender Database and Statewide Murder and Violent Offender Against Youth Database, as such re-checks are periodically required by law. The Board reserves the right to terminate this Contract should any required periodic re-check result in the Superintendent being deemed by the Board unacceptable to work in the District, in accordance with applicable law.

4. **Employment Representations.** The Superintendent represents that they will not be under contract with any other school district or cooperatives for any portion of the term covered by this contract. The Superintendent further represents that all information provided to the District in the process of application for employment was true and complete.

C. BENEFITS

1. **Reimbursement of Business Expenses.** The Board will reimburse the Superintendent for reasonable monthly expenses incurred in the performance of their duties. Mileage reimbursement for all travel on behalf of the District will be logged by the Superintendent and reimbursed by the Board. Itemization will be made by the Superintendent of all expenses incurred. Substantiation of all expenses incurred pursuant to this provision will be made by the Superintendent in accordance with the regulations of the *Internal Revenue Code*, as amended, and Board policy and procedures.

2. **Insurance.** The Board will contribute towards the cost of the following health and disability benefit insurance premiums as specified below for each year of this contract:

   a. Up to one hundred percent (100%) of the PPO 500 single hospitalization/medical insurance premiums;

   b. Up to ninety percent (90%) of the PPO 500 family hospitalization/medical insurance premiums and ninety percent (90%) of the dental insurance premiums, as provided under any group program effective in the District;

c. Ninety percent (90%) of the disability insurance premiums as provided under any group program effective in the District, subject to all eligibility conditions of the District's group program carrier.

The Superintendent may alter the terms of the insurance benefit plans to the extent allowed or select a less expensive insurance plan in order to change the costs to fit within the Board contribution limits established herein. Any health or disability insurance costs that exceed the amounts over the current year benefit paid by the Board will be deducted from the Superintendent's salary. If the Board contribution of ninety percent (90%) of the premium of the PPO 500 family hospitalization medical insurance would exceed the cost of the premiums for the insurance plan selected by the Superintendent, the Superintendent will not be entitled to the difference.

3. Other Insurance. The Board will provide the Superintendent with the following other insurance benefits.

a. Liability indemnification and protection, as provided under the District's liability insurance policies;

b. Term life insurance, in the amount of two (2) times the salary of the Superintendent as set forth in paragraph A.1 of this contract, subject to all eligibility conditions of the District's group program carrier; and

4. Vacation. The Superintendent will be entitled to twenty (20) vacation days each contract year. Vacation days must be taken within the contract year that they were issued, unless the Superintendent requests, and the Board formally approves, a carry-over of annual vacation days to the next contract year. In no event may the Superintendent carryover more than five (5) days. At the end of the contract, any accumulated, unused vacation time will be paid to the Superintendent, as required under Illinois law, in a separate payment made between thirty (30) and sixty (60) days after the termination of their employment in the District or after their last paycheck, whichever date is later. The Superintendent will also be entitled to all legal and school holidays as designated on the District calendar. Winter, Spring, and Summer recess periods shall constitute working days unless specifically scheduled and credited toward the vacation days listed above.

5. Sick Leave. Each contract year, the Superintendent will be granted twelve (12) sick leave days, as defined in Section 24-6 of the *School Code*, which may accumulate to a maximum of three hundred forty (340) days. In no event will the number of sick days granted annually to the Superintendent exceed the number of days afforded to teachers in the District under their collective bargaining agreement.

6. Personal Leave. The Superintendent will be granted four (4) days of personal leave annually. At the end of a contract year, any unused personal leave days will be added to the Superintendent's accumulated sick leave.

7. **Professional Development and Professional Organizations.** The Superintendent and Board will agree upon and document goals and a budget for the Superintendent's ongoing professional development and membership to professional organizations, including the Superintendent's requirements needed to maintain certification noted in paragraph B.1 of this contract. The Superintendent will present a professional development plan to the Board no later than the July Board of Education meeting for each year of the contract. Upon submission and approval, the Board of Education will reimburse business expenses associated with the activities set forth in the professional development plan. Businesses expenses include registration, transportation, and meals while participating in professional development activities. Business expenses specifically exclude alcohol and entertainment that is not directly related to the educational mission of the professional development activity. To the extent that expenses for an approved activity are expected to exceed Five Hundred Dollars ($500) per day, the Superintendent shall obtain prior approval from the Board for reimbursement. On an annual basis, the Superintendent shall not be away from the office for professional development for more than ten (10) total days per Contract year without prior approval of the Board.

8. **Civic Organizations.** The Superintendent is strongly encouraged to participate in local civic and fraternal organizations in the interest of promoting a better understanding of the District and its concerns. Subject to its prior approval, the Board will pay the dues incurred through membership in such organizations.

D. POWERS AND DUTIES

1. **Duties.** The Superintendent shall have charge of the administration of the schools under the direction of the Board; they shall be the chief executive officer for the Board; shall recommend the selection, retention and dismissal of, and direct and assign, teachers and other employees of the School District under his supervision; shall organize and direct the administrative and supervisory staff; shall make recommendations to the Board concerning the budget, building plans, location of sites, and the selection of textbooks, instructional material, and courses of study; shall direct the keeping of all records and accounts, and aid in the making of all reports, as required by the Board; shall ensure the School District operates in accordance with all areas of Board policy; shall recommend rules, regulations, and procedures deemed necessary for the welfare of the School District; and, in general, shall perform all other duties incident to the office of the Superintendent as the Board may delegate to them or as may be required by law and/or Board Policy 3:40.

2. **Extent of Service.** The Superintendent shall devote their entire time, attention, and energy to the business of the School District and related professional activities. With the permission of the Board, the Superintendent may attend university courses, seminars, or other professional growth activities; serve as a consultant to another district or educational agency for a short-term duration without loss of salary; and/or lecture and engage in writing activities and speaking engagements. The Superintendent may not engage in any outside service or activity that would jeopardize the functioning of the School District nor shall they be absent from the School District for any lengthy or conspicuous amount of time for such professional activities.

3. **Performance Goals and Indicators.** In accordance with the requirements of the *School Code,* and prior to July 1, 2026, the parties agree that performance goals for the Superintendent will be established with respect to student performance and academic improvement, including the indicators listed beneath the goals that will be used by the Board to measure the Superintendent's performance. These performance goals and indicators will be attached and incorporated into this contract as Appendix A. The parties further acknowledge that the development and inclusion of Appendix A is a condition precedent to this multi-year contract's legal effectiveness and the obligations of the parties hereunder.

The Board will determine whether the Superintendent has met the performance goals using the criteria described in the goals themselves, as well as Board members' own judgment as to whether the Superintendent has exhibited the leadership, guidance and effort needed to achieve the goals. The Board will make this determination after an evaluation of the Superintendent. The Board will issue its determination in writing and present it to the Superintendent during the annual evaluation required under paragraph G of this contract.

Further, the Board reserves the right to establish, with input from the Superintendent, additional annual goals for the Superintendent that are not intended to be performance goals within the meaning of the School Code. The Board's and Superintendent's decision to add, modify, or replace performance goals will not require and does not constitute an amendment to this Contract.

E. RENEWAL, EXTENSION, AND AMENDMENT OF CONTRACT

1. **Renewal and Extensions.** Prior to the end of any year of this contract, the Board and Superintendent may mutually agree to renew or extend the employment of the Superintendent for a multi-year period, provided that the performance goals and indicators set forth in Appendix A of this contract have been met. In such event, the Board will take specific action to discontinue this contract and enter into a new multi-year contract of employment.

2. **Non-Renewal.** Notice of intent not to renew this contract will be given to the Superintendent by the Board by February 1 of the year in which the contract expires. Said notice will be in writing and state the specific reason for non-renewal. Failure to provide timely notice of non-renewal will extend this contract for one (1) additional year. The Superintendent shall notify the President and Secretary of the Board in writing by January 1 of the year in which the contract expires that failure of the Board to give the Superintendent said notice of intent not to renew will extend this contract for one (1) additional year. The failure of the Superintendent to give the required reminder notice to the Board shall waive the obligation of the Board hereunder to give its notice of intent by February 1. Within ten (10) days after receipt of a notice of intent not to renew this contract, the Superintendent may request a closed session hearing on the dismissal.

3. **Amendment.** Any salary or other adjustment or modification made during the life of this contract (including any modifications to the Superintendent's performance goals and

indicators) will be in the form of a written amendment and will become a part of this contract, but such adjustment or modification shall not be construed as a new contract with the Superintendent, or as an extension of the termination date of this contract.

F. TERMINATION

1. **Grounds for Termination.** This employment contract may be terminated prior to the termination date set forth in Section A.1. by:

   a. Mutual agreement, in writing;

   b. Upon the Superintendent's Permanent disability (inability to perform essential job functions with or without accommodation);

   c. Via discharge for cause;

   d. Upon the death of the Superintendent; or

2. **Cause.** Discharge for cause will be for any conduct, act, or failure to act by the Superintendent which is detrimental to the best interests of the School District. Reasons for discharge for cause will be given in writing to the Superintendent, who shall be entitled to notice and a hearing before the Board to discuss such causes. If the Superintendent chooses to be accompanied by legal counsel, they will bear any costs therein involved. The Board hearing shall be conducted in executive session.

If, after the hearing, the Board determines to discharge the Superintendent for cause, the Superintendent's contract will terminate immediately. All salary that had been earned, but not paid, will be paid in accordance with the Illinois Wage Payment and Collections Act. All salary and benefits under the contract that have not been earned as of the date of termination will be forfeited by the Superintendent upon discharge for cause.

3. **Notice of Resignation or Retirement by Superintendent.** The Superintendent will notify the Board President, in writing, no less than one hundred and twenty (120) days before voluntarily resigning and/or retiring from their position as Superintendent of the District. The Board will waive the required notice if the Superintendent resigns or retires as a result of the Superintendent's serious medical condition or the serious medical condition of an immediate family member as that term is defined in 105 ILCS 5/24-6 of the Illinois School Code.

4. **Liquidated Damages.** In the event the Superintendent resigns from their position prior to the end of this contract, the Superintendent will be liable for liquidated damages. The Superintendent will be liable for Twenty-Five Thousand Dollars ($25,000) if the Superintendent resigns following the first year of the contract or Twenty Thousand Dollars ($20,000) if the Superintendent resigns following the second year of the contract. Liquidated damages will be deducted from the Superintendent's final pay, if available, or will be otherwise payable to the Board of Education following termination of the contract to offset the costs to be incurred by the

District for an executive search firm, unless the Board, in its sole discretion, waives liquidated damages.

G. EVALUATION

The Board and Superintendent agree that annually they will mutually discuss and evaluate their working relationship, rapport, and understanding. By March 1st of each year of the contract, the Board and Superintendent will meet to informally review the Superintendent's performance and progress toward performance goals. The Superintendent's performance will be appraised by the Board and a written evaluation of that performance given to the Superintendent by August 15th of each year of the contract except that in the final year of the contract such written evaluation will be completed and given by June 15. As required under the *School Code*, the Board will evaluate the Superintendent in their administration of school board policies and their stewardship of the assets of the District. After such evaluation, the parties will schedule a meeting to review the evaluation and determine, if necessary, the terms and conditions of, and the performance goals for, the continued future employment of the Superintendent. The Superintendent's progress toward and attainment of the performance goals set forth in Appendix A of this contract will also be assessed in conformance with the procedures in paragraph D.3 of this contract and Board Policy.

H. MISCELLANEOUS

1. Any notice required to be given under this contract will be deemed sufficient if it is in writing and sent by certified mail with return receipt requested to the last known residence of the Superintendent or the President of the Board.

2. This contract has been executed in Illinois and will be governed in accordance with the laws of the State of Illinois in every respect.

3. Paragraph headings and numbers have been inserted for convenience of reference only and, if there is any conflict between such headings or numbers and the text of this contract, the text will control.

4. This contract may be executed in one or more counterparts, each of which will be considered an original, and all of which taken together will be considered one and the same instrument.

5. This contract contains all the terms agreed upon by the parties with respect to the subject matter of this contract and supersedes all prior agreements, arrangements, and communications between the parties concerning such subject matter, whether oral or written.

6. If any portion of this Contract is deemed illegal due to conflict with State or Federal law, the remainder of the Contract will remain in full force and effect: further, this Contract does not constitute any obligation either written or implied for re-employment beyond the term set forth herein.

7. This contract will inure to the benefit of and be binding upon the Board and its successors and assigns.

SIGNATURE PAGE TO FOLLOW

IN WITNESS WHEREOF, the parties have executed this Agreement this 23rd day of February, 2026, upon formal approval by the Board at a duly convened meeting held this same date.

SUPERINTENDENT

Dr. Sarah Cacciatore

Dr. Sarah Cacciatore

BOARD OF EDUCATION
COMMUNITY CONSOLIDATED
SCHOOL DISTRICT NO. 26,
McHENRY COUNTY, ILLINOIS

By: _____
President

ATTEST:

_____
Secretary

CARY COMMUNITY CONSOLIDATED SCHOOL DISTRICT
2115 Crystal Lake Road • Cary, Illinois 60013 • (224) 357-5100 • Fax (847) 639-3898
Briargate • Deer Path • Oak Knoll • Three Oaks • Cary Junior High
www.cary26.org

Dr. Jennifer Thomas Interim Superintendent
Ms. Ivette Rivera Associate Superintendent of Teaching and Learning
Ms. Kimberly Dahlem Interim Director Special Services & Instruction
Mr. David Shepherd Associate Superintendent of Finance and Operations
Mr. Brian DeRoo Director of Human Resources

Memo

To: **Board of Education**

From: **Brian DeRoo, Director of Human Resources**
Dr. Jennifer Thomas- Interim Superintendent

Date: **February 20th, 2026**

Re: **Recommendation for Assistant Superintendent of Special Services**

Recommendation
We are recommending the employment of Dr. Kristen Bordonaro as Assistant Superintendent of Special Services for Cary School District 26 for the 2026-2027 school year. Dr. Bordonaro is being recommended to replace the interim Director of Special Services, Kimberly Dahlem. Ms. Dahlem will be relieved of her interim role as on 6/30/2026.

Interview Process
The interview process involved a paper screening of 11 applicants, a 1st round interview with 5 candidates, and a final interview of the 3 top candidates. All interviewed applicants were external. Round 1 interviews were conducted by a committee that consisted of the Human Resources Director, Assistant Superintendent of Teaching and Learning, Assistant Superintendent of Finance, Interim Superintendent, and an assistant principal. The Round 2 interview team included the Director of Human Resources, Interim SPED Director and 5 employees from various SPED services positions in the district. Following the final interview, the committee unanimously agreed that Dr. Bordonaro was the most qualified candidate and would make the smoothest transition into the position. She was also the top choice for the round 1 interview team.

Education
Dr. Bordonaro's professional training includes a Master's Degree in Educational Leadership, a Master's Degree in special education, a doctorate in Educational Leadership, and a Bachelor's Degree in elementary education.

Work Experience Summary
Dr. Bordonaro comes to this position with a multitude of experience as a Navy Mental Health Counselor, Student Services Coordinator, Director of Student Service, and a consultant for the Exceptional Learners Collaborative. Her breadth of knowledge of Special Services truly covers every aspect of students in special programs.

References
References for Dr. Bordonaro were glowing with many mentioning her deep knowledge of building SPED programs and helping students. Dr. Bordonaro also wrote a book that was recommended to our staff for organization of the IEP process.

Recommendation

It is our pleasure to recommend Dr. Kristen Bordonaro for position of Assistant Superintendent of Special Services. If approved, Dr. Bordonoro will enter into a 12-month, single-year contract at a salary of $120,000 that will begin July 1, 2026 and end June 30, 2027.

Dr. Kristen Bordonaro, Ed.D.

[redacted]

Professional Summary

Accomplished special education leader with expertise in program development, compliance, and staff growth. Skilled in leading intentional, student-centered initiatives, fostering collaborative district cultures, and ensuring adherence to federal, state, and district regulations. Proven ability to build partnerships with staff, families, and community stakeholders, driving equity and continuous improvement. Experienced in guiding cross-functional teams, implementing human capital strategies, growing staff capacity, building high-performing teams, and strengthening program delivery models through professional development and strategic support for diverse learners.

Highlights

- Program Development & Service Delivery
- Collaborative Stakeholder Engagement
- Pending: PHCLE (Jan 2026), CSBO Endorsement (June 2026)
- Compliance & Regulatory Oversight
- Instructional Leader
- Licensure: Superintendent, Director of Special Education, General Administrative, LBS 1

Professional History

Director of Specialized Programs, 2024 to Current
Wauconda D118 – Wauconda, IL

- Developed and implemented strategic initiatives to enhance educational outcomes across district programs.
- Led cross-functional teams to drive curriculum alignment and instructional improvement efforts.
- Collaborated with administrative team, ensuring resource optimization for maximum impact on student services.
- Fostered partnerships with local organizations to expand community engagement and support services for students.
- Mentored staff in effective instructional practices and facilitated ongoing professional development to enhance teaching and learning.
- Analyzed performance data to inform decision-making and improve program effectiveness across the district.
- Facilitated stakeholder meetings to gather input and align district goals with community needs and expectations.
- Established a culture of continuous improvement by fostering open communication channels and empowering employees to voice their ideas.
- Cultivated a positive work environment that fostered employee engagement, increased retention rates, and boosted overall team morale.
- Launched district curriculum tools for guaranteed, viable instruction within special education settings.

Director of Programs/Director of Shared Services
Various Districts in Illinois – 2015 to Present
Special Education & District Leadership

- Serve as District LEA and Instructional Leader for EC–Transition programs

- Lead curriculum alignment, instructional planning, and implementation of Multi-Tiered Systems of Support (academic, behavior, SEL)
- Design and deliver high-impact professional development, new staff orientation, and institute/job-alike days for certified and classified staff
- Recruit, hire, evaluate, and mentor staff to build high-performing teams and strengthen program delivery models
- Manage federal and state grants, cooperative/district IEP systems, medicaid reimbursement, and data management solutions
- Expand district programs including day camps, transition vocational sites, Pre-K blended learning, and Extended School Year services
- Provide strategic guidance and high-profile case management for crisis intervention, legal compliance, and complex student needs
- Foster family and community engagement through outreach programs, parent networks, and collaborative partnerships
- Optimize district operations, including special education transportation, resulting in improved efficiency and cost savings
- Serve as a model district for local, state, and national districts to collaborate on best practices in special education
- Represent districts at local and national conferences to share innovations, establish thought leadership, and influence best practices
- Drive organizational change by analyzing data, identifying priorities, and implementing sustainable strategies to improve student outcomes
- Cultivate a culture of collaboration, equity, and continuous improvement that empowers staff, engages families, and enhances learning environments

Coordinator of Special Education
North Chicago School Dist 187
Coordinator of Special Education EC- 12th Grade

- LEA for all special education needs
- Collaborate with district and building leaders around best practices for special education and data smart problem solving
- Collaborate with ISBE and district leaders to identify and close special education findings
- Provide weekly professional development on instructional practices to meet the needs of students
- Implement district wide building based quarterly data reviews to identify learning strengths and challenges and create tiered intervention groups
- Provide oversight of evaluation, identification, and plan development for students within special education
- With district leaders, conduct learning walks and monitor school improvement plans
- Implement and Oversee Extended School Year program for At Risk and Special Education students
- Support student crisis needs throughout district
- Hiring, assignment and professional development of special education staff members

Solution Tree Author, Associate, Coach, 04/2016 to Current
Independent Contractor – Bloomington IN
Author, Associate and Coach focusing on supporting school districts and school teams in:

- Special Education Leadership & Inclusive Practices
- Collaborative Team Building & Guiding Coalitions
- PLC and RTI Implementation & Design
- Beyond Labels/Yes We Can

Special Education Teacher
Antioch CCSD 34

Special Education Teacher/Program Manager
One Hope United

Mental Health Counselor
United States Navy

Professional Contributions

- PHCLE anticipated (Jan 2026)
- CSBO Endorsement anticipated (November 2026)
- Presented at International, National, State and Local Conferences on creating learning environments to meet needs of all learners, individualized instruction and proactive supports for behaviors within general education schools
- Adjunct Professor for Elementary Education, Special Education & General Education Courses

Education

Doctor of Education: Educational Leadership
Aurora University - Aurora, IL

Master of Arts: Educational Leadership
Concordia University - River Forest, IL

Master of Science: Special Education
Dominican University - River Forest

Bachelor of Arts: Elementary Education
Trinity International University - Deerfield, IL

ASSISTANT SUPERINTENDENT OF SPECIAL SERVICES EMPLOYMENT CONTRACT

AGREEMENT made this 23rd[th] day of February, 2026, between the **BOARD OF EDUCATION OF CARY COMMUNITY CONSOLIDATED SCHOOL DISTRICT NO. 26, McHENRY COUNTY, ILLINOIS**, hereinafter referred to as the "Board," and **Dr. Kristen Bordonaro**, hereinafter referred to as the "Assistant Superintendent."

A. EMPLOYMENT AND COMPENSATION

Salary and Term of Employment. The Board hereby employs the Assistant Superintendent of Special Services for the 2026-2027 school year, commencing on July 1, 2026, and terminating on June 30, 2027 (261 days Per Year), at a salary of One Hundred Twenty Thousand Dollars. ($120,000.00)

The Assistant Superintendent's salary is payable in twenty-four equal installments in accordance with the rules of the Board governing payments of other administrative staff members in the District. The Assistant Superintendent hereby accepts employment upon the terms and conditions hereinafter set forth.

2. **Teacher's Retirement System and Health Insurance Security Fund.** In addition to the annual salary stated in paragraph A.1 of this contract, the Board shall pay on behalf of the Assistant Superintendent to the State of Illinois Teachers' Retirement System the amount of 4.712% of the Assistant Superintendent's required contributions to said pension system. The Assistant Superintendent shall not have any right or claim to said amounts, except as they may become available at the time of retirement or resignation from the State of Illinois Teachers' Retirement System. Both parties acknowledge that the Assistant Superintendent did not have the option of choosing to receive the contributed amounts directly, instead of having such contributions paid by the Board to the Teachers' Retirement System, and further acknowledge that such contributions are made as a condition of employment to secure the Assistant Superintendent's future services, knowledge and experience. The salary stated in paragraph A.1 of this contract includes the payment by the Board on behalf of the Assistant Superintendent of her remaining required contributions to both the Teachers' Retirement System and to the Teacher Health Insurance Security Fund.

B. CONDITIONS OF EMPLOYMENT

1. **License.** During the term of this contract, the Assistant Superintendent shall hold and maintain a valid and properly registered Professional Educator's License issued by the State of Illinois Teachers' Certification Board qualifying her to act as a Assistant Superintendent in the School District.

2. **Employment Representations.** The Assistant Superintendent represents that she is not under contract with any other school district for any portion of the term covered by this contract. The Assistant Superintendent further represents that all information provided to the District in the process of application for employment was true and complete.

3. **Medical Examination.** As a required condition of employment for new employees, the

Assistant Superintendent shall submit to a physical examination by a physician licensed in Illinois to practice medicine and surgery in all its branches, and shall provide the Board with evidence of physical fitness to perform duties assigned and freedom from communicable disease, pursuant to Section 24-5 of the *School Code*. The Assistant Superintendent shall further submit, at Board expense, to a physical or mental examination by a physician licensed in Illinois to practice medicine and surgery in all its branches whenever the Board deems such examination necessary and in accordance with applicable law. As a condition of employment the Assistant Superintendent also agrees to comply with all health requirements established by law.

4. **Criminal Background Investigation.** As a required condition of employment for new employees, the Assistant Superintendent shall authorize a criminal background investigation by the Board, pursuant to the *School Code,* and a DCFS Child Abuse Registry background investigation.

C. BENEFITS

1. **Reimbursement of Business Expenses.** The Board shall reimburse the Assistant Superintendent for reasonable monthly expenses, including mileage, incurred in the performance of her duties. Substantiation of all expenses incurred pursuant to this provision shall be made by the Assistant Superintendent in accordance with the regulations of the *Internal Revenue Code*, as amended.

2. **Insurance.** The Board will provide the Assistant Superintendent with the following benefits:

a. The District will pay 100% of single hospitalization/medical and dental insurance. The District will pay 90% of the premium for the family portion of PPO 500 medical and dental plan and the Assistant Superintendent will pay 10% of the premium. The Assistant Superintendent may elect a different plan offered by the District in order to lower her contribution cost. These plans include PPO 750, HMO, and PPO 2000.

b. Disability insurance coverage as provided under any group program effective in the District;

c. Liability insurance, as provided to other administrators;

d. Term life insurance, in the amount of $50,000.

3. **Vacation.** The Assistant Superintendent shall be entitled to a paid vacation of twenty (20) working days in each contract year. Vacation must be taken within the twelve-month contract year period, unless the Assistant Superintendent requests, and the Board approves, a carry-over of annual vacation days to the next contract year. In no event may vacation time carry over and accumulate beyond a maximum of ten (10) days. Any accumulated, unused vacation time shall be paid to the Assistant Superintendent, as required under Illinois law, in a separate payment following the termination of her employment in the District. The Assistant Superintendent shall also be entitled to all legal holidays. Winter, Spring, and Summer recess periods shall constitute working days unless specifically scheduled and credited toward the vacation days listed above.

4. **Sick Leave.** The Assistant Superintendent shall be granted sick leave, as defined in Section 24-6 of the *School Code*, of fifteen (15) working days per year, which may be accumulated to a maximum of three hundred and forty (340) days.

5. **Personal Leave.** The Assistant Superintendent shall be granted three (3) days of personal leave. Unused personal leave shall be transferred to sick leave annually.

6. **Professional Organizations.** Subject to prior approval of the Superintendent, the Assistant Superintendent shall be reimbursed for dues and membership fees to professional organizations in an amount established annually by the Board.

7. **Professional Meetings Attendance.** The Assistant Superintendent is expected to attend appropriate professional meetings at the local and state levels, and, subject to prior approval of the Superintendent, at the national level. All reasonable expenses incurred shall be paid by the Board.

8. **Annuities and Deferred Compensation.** From the annual salary stated in paragraph A.1 of this contract, the Assistant Superintendent may (1) annually defer compensation pursuant to and in accordance with the terms of an eligible state deferred compensation plan as described in Section 457 of the *Internal Revenue Code* if adopted by the Board, or (2) authorize a salary reduction in order that the Board may purchase an annuity policy for the Assistant Superintendent as described in Section 403(b) of the *Internal Revenue Code*, provided that the Assistant Superintendent confirms that any such deferrals or reductions for purchase of annuities are within *Internal Revenue Code* limitations.

D. POWERS AND DUTIES

1. **Responsibilities and Duties.** The Assistant Superintendent shall supervise the operation of the Special Services Department and shall as the Board determines have as her primary responsibility the coordination and supervision of all aspects of the school district's special student responsibilities. The Assistant Superintendent shall also assume administrative responsibilities and leadership, under the supervision and direction of the Superintendent and in accordance with the laws of the State of Illinois and the policies, rules, and regulations of the Board, for the planning, operation and evaluation of the financial program of the District.

The Assistant Superintendent shall submit recommendations, as requested, to the Superintendent concerning the appointment, retention, promotion, and assignment of all Special Services personnel assigned to her areas of responsibility and shall keep such other registers, records and reports as may be directed by the Superintendent and the Board or required by law. The Assistant Superintendent shall be responsible for all obligations contained in the official job description for her position in the District in accordance with the *School Code* and Board policy. The Assistant Superintendent shall be responsible for, and deemed to have knowledge of, all of the policies and rules and regulations established by the Board and shall comply with their requirements.

2. **Extent of Service.** The Assistant Superintendent shall devote her entire time, attention, and energy to the business of the School District and related professional activities. With the permission of the Board, the Assistant Superintendent may attend university courses, seminars, or other professional growth activities; serve as a consultant to another district or educational agency for a short-term duration without loss of salary; lecture; and engage in writing activities and speaking engagements. The Assistant Superintendent may not jeopardize the functioning of the School District by any lengthy and conspicuous absence for such professional activities.

E. RENEWAL, EXTENSION, AND AMENDMENT OF CONTRACT

1. **Renewal.** At the end of this contract, the Board and Assistant Superintendent may mutually agree to renew the employment of the Assistant Superintendent for a one (1) or a multi-year period. In such event, the Board shall take specific action to enter into a new contract of employment with the Assistant Superintendent.

2. **Non-Renewal.** In the event the Board determines not to extend the employment of the Assistant Superintendent, this contract shall expire on June 30, 2027. The Assistant Superintendent shall receive notice of intent not to renew her employment in accordance with the requirements of the *School Code*.

3. **Amendment.** Any salary or other adjustment or modification made during the life of this contract shall be in the form of a written amendment and shall become a part of this contract, but such adjustment or modification shall not be construed as a new contract with the Assistant Superintendent or as an extension of the termination date of this contract.

F. TERMINATION

1. **Grounds for Termination.** This employment contract may be terminated during its term by:

   a. Mutual agreement;

   b. Permanent disability (inability to perform essential job functions with or without reasonable accommodation);

   c. Discharge for cause; or

   d. Death of the Assistant Superintendent.

2. **Cause.** Discharge for cause during the term of this contract shall be for any conduct, act, or failure to act by the Assistant Superintendent which is detrimental to the best interests of the School District. Reasons for discharge for cause shall be given in writing to the Assistant Superintendent, who shall be entitled to notice and a hearing before the Board to discuss such causes. If the Assistant Superintendent chooses to be accompanied by legal counsel, she shall bear any costs therein involved. The Board hearing shall be conducted in executive session.

G. MISCELLANEOUS

1. Any notice required to be given under this contract shall be deemed sufficient if it is in writing and sent by mail to the last known residence of the Assistant Superintendent or the President of the Board.

2. This contract has been executed in Illinois and shall be governed in accordance with the laws of the State of Illinois in every respect.

3. Paragraph headings and numbers have been inserted for convenience of reference only and, if there shall be any conflict between such headings or numbers and the text of this contract, the text shall control.

4. This contract may be executed in one or more counterparts, each of which shall be considered an original, and all of which taken together shall be considered one and the same instrument.

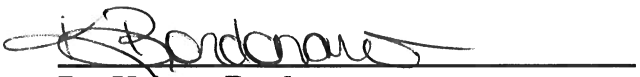
5. This contract contains all the terms agreed upon by the parties with respect to the subject matter of this contract and supersedes all prior agreements, arrangements, and communications between the parties concerning such subject matter, whether oral or written.

6. This contract shall inure to the benefit of and be binding upon the Board and its successors and assigns.

IN WITNESS WHEREOF, the parties have executed this Agreement this 23rd day of February, 2026, upon formal approval by the Board at a duly convened meeting held this same date.

ASSISTANT SUPERINTENDENT OF SPECIAL SERVICES

BOARD OF EDUCATION
CARY COMMUNITY CONSOLIDATED SCHOOL DISTRICT NO. 26,
McHENRY COUNTY, ILLINOIS



Dr. Kristen Bordonaro

By: _____
President

ATTEST:

_____
Secretary

CARY COMMUNITY CONSOLIDATED SCHOOL DISTRICT

2115 Crystal Lake Road • Cary, Illinois 60013 • (224) 357-5100 • Fax (847) 639-3898

Briargate • Deer Path • Oak Knoll • Three Oaks • Cary Junior High

Dr. Jennifer Thomas
Interim Superintendent

Ms. Ivette Rivera
Associate Superintendent of Teaching and Learning

Ms. Kimberly Dahlem
Interim Director Special Services & Instruction

Mr. David Shepherd
Associate Superintendent of Finance and Operations

Mr. Brian DeRoo
Director of Human Resources

PHASEOUT OF USE AGREEMENT

This agreement ("Agreement") is entered into as of February 23, 2026, by and between Cary Community Consolidated School District 26, an Illinois public school district, ("Cary") and Tiffin University, an Ohio private institution of higher education, ("Tiffin"). Cary and Tiffin may be referred to individually as a "Party" and collectively as the "Parties."

WHEREAS, Tiffin owns and has continuously used since 2007 a certain dragon head logo design ("Logo") in its provision of education services; and

WHEREAS, Tiffin owns all right, title, and interest in the US trademark registration for the Logo, as is described in the Logo trademark certificate, a copy of which is attached hereto and incorporated herein as Exhibit A; and

WHEREAS, Cary has historically used the Logo on certain materials as part of its provision of education services both prior to Tiffin's trademark and later with no knowledge of Tiffin's trademark; and

WHEREAS, Tiffin seeks to provide Cary with a reasonable period of time during which Cary will phase out all use of the Logo in Cary's provision of education services; and

WHEREAS, in light of the forgoing, the Parties now desire to enter into an agreement under which Cary will implement a plan to cease use of the Logo;

NOW, THEREFORE, IN CONSIDERATION OF THE FOREGOING RECITALS AND OTHER GOOD AND VALUABLE CONSIDERATION CONTAINED HEREIN, CARY AND TIFFIN HEREBY AGREE AS FOLLOWS:

1. **Recitals.** The foregoing recitals are hereby incorporated by this reference.

2. **No Admissions.** Nothing in this Agreement shall be construed as an admission of liability by either Party.

3. **Termination of Use.** Subject to the terms of this Agreement, Cary agrees to use reasonable efforts to end its use of the Logo in compliance with the dates specified herein.

   3.1. Digital and Electronic Materials. Cary shall end its use of the Logo in its electronic materials, including any websites, social media accounts, digital advertisements, and email signatures by no later than January 31, 2026.

   3.2. Printed Materials. Cary shall end its use of the Logo on physically printed materials, including brochures, flyers, backdrops, tablecloths, flags and similar materials by no later than September 1, 2026.

   3.3. Volleyball Athletic Uniforms. Cary shall end its use of the Logo on volleyball athletic uniforms by no later than December 31, 2029. Until such time, Cary may continue to use volleyball athletic uniforms which display the Logo. Further, Cary may order additional volleyball athletic uniforms that include the Logo up until December 31, 2029, provided they are doing so in order to replace a student's misplaced or damaged uniform and to allow a student to wear a uniform that matches the set of uniforms worn by other volleyball team members. Cary shall not increase the quantity of uniforms bearing the Logo beyond the number reasonably necessary to maintain the uniform set in existence as of the Effective Date of this Agreement.

   3.4. Boys Basketball Athletic Uniforms. Cary shall end its use of the Logo on boys basketball student athletic uniforms by no later than December 31, 2030. Until such time, Cary may continue to use boys basketball athletic uniforms which display the Logo. Further, Cary may order additional boys basketball athletic uniforms that include the Logo up until December 31, 2030, in order to replace a student's misplaced or damaged uniform and to allow a student to wear a uniform that matches the set of uniforms worn by other boys basketball team members. Cary shall not increase the quantity of uniforms bearing the Logo beyond the number reasonably necessary to maintain the uniform set in existence as of the Effective Date of this Agreement.

   3.5. Existing Documents. Except as specified herein, this Agreement does not require Cary to delete, remove, erase, republish, edit or otherwise modify or end its use of existing documents in any format, whether digital or hardcopy, which display the Logo and are in existence as of the Effective Date of this Agreement.

   3.6. Other Uses. Cary shall end all other of its known uses of the Logo not specifically identified herein by no later than January 31, 2026.

4. **Tiffin Responsible for Enforcing Its Own Rights.** Tiffin, as the owner of the trademarked Logo, is solely responsible for enforcing its rights against third parties for use of the Logo. Cary shall not be responsible for any third party's use of the Logo or the use of the Logo by any person or entity outside of the control of Cary.

5. **No Liability for Unaffiliated Uses**. Cary shall not be liable or responsible for any third-party use of the Logo, including use by any person or entity other than Cary, where such use is not authorized, licensed, directed, supervised, or controlled by Cary. Any use of the Logo by a third party is without the knowledge, authorization, or consent of Cary and is not undertaken at the direction of, or under the control or supervision of, Cary in any manner.

6. **No Third-Party Authorization.** Cary does not authorize any third-party use of the Logo, and any such use shall not be deemed authorized by, attributable to, or undertaken on behalf of Cary, nor shall any third party be deemed an agent of Cary with respect to the Logo.

7. **No Requirement to Destroy Usable Property.** Nothing in this Agreement shall require Cary to destroy, recall, or prematurely discard otherwise usable property prior to the dates specified herein.

8. **No New Intentional Branding Use.** Following the Effective Date, Cary agrees not to intentionally create new materials featuring the Logo, except as reasonably necessary prior to the termination of use dates specified in Section 3 of this Agreement, such as for the purpose of repair, replacement, or technical necessity.

9. **Reasonable Compliance Standard.** Cary's obligations under this Agreement shall be satisfied by reasonable efforts. Inadvertent or de minimis uses of the Logo that are promptly corrected upon notice shall not constitute a breach of this Agreement, and any use appearing in archival materials, historical records, cached or third-party platforms, or materials not reasonably within Cary's control, shall not constitute a breach of this Agreement.

10. **Cooperation and Extensions.** The Parties agree to cooperate in good faith. If Cary reasonably requires additional time to end a particular type of use of the Logo due to logistical, operational, or financial constraints, Tiffin shall not unreasonably withhold consent to a mutually agreed upon extension.

11. **Release.** Tiffin irrevocably releases, waives, and discharges Cary from any and all claims, causes of action, demands, liabilities, or remedies, whether at law or in equity, known or unknown, suspected or unsuspected, arising at any time, whether before, on, or after the Effective Date, arising out of or relating in any way to the Logo, and Tiffin further covenants and agrees that it shall not initiate, assert, or participate in any claim, action, or proceeding against Cary based on or relating to Cary's use of the Logo, a third party's use of the logo, or any alleged use thereof, provided however that nothing herein shall limit Tiffin's right to enforce this Agreement in the event of a material breach by Cary.

12. **Severability of Terms.** If any provision of this Agreement is held to be invalid or unenforceable by a court of competent jurisdiction, that determination shall not invalidate or render unenforceable any other provision of this Agreement.

13. **Governing Law.** This Agreement shall be governed by and construed in accordance with the laws of the State of Illinois, without regard to its conflict-of-laws principles.

14. **Entire Agreement.** This Agreement constitutes the entire agreement between the Parties regarding the subject matter hereof and supersedes all prior discussions or understandings.

15. **Binding Agreement.** This Agreement shall be binding on the representatives, assigns, and su ccessors of each Party hereto.

16. **Modification.** This Agreement may only be modified or amended by a written instrument executed by all Parties.

17. **Counterparts.** This Agreement may be executed in counterparts, each of which shall be deemed an original.

18. **Electronic Signature.** This Agreement may be executed using electronic signature.

19. **Headings.** The headings used in this Agreement are for convenience of reference only and shall not affect the interpretation or construction of this Agreement.

20. **Effective Date**. The Effective Date of this Agreement shall be on the date that each Party, through their respective representative, has signed and executed this Agreement.

IN WITNESS WHEREOF, the Parties have executed this Agreement as of the Effective Date first written above.

[SIGNATURE PAGE FOLLOWS]

Cary Community Consolidated School District 26	**Tiffin University**
By: _____	By:_____
Name: Deanna Darling_____	Name: _____
Title: President, D26 Board of Education	Title: _____
Date: _____	Date:_____
Attest	Attest
By: _____	By: _____
Name: Melinda Hartman_____	Name: _____
Title: Vice President, D26 Board of Education	Title: _____
Date: _____	Date:_____

EXHIBIT A

United States of America

United States Patent and Trademark Office



Reg. No. 7,832,563

Registered Jun. 17, 2025

Int. Cl.: 16, 25, 41

Service Mark

Trademark

Principal Register

Tiffin University (OHIO non-profit corporation)
155 Miami Street
Tiffin, OHIO 44883

CLASS 16: Decals; Paper notebooks; Pencils; Pennants of paper; Pens; Printed educational materials in the field of collegiate sports; Stickers; Magnetic decals

FIRST USE 01-01-2007 ; IN COMMERCE 01-01-2007

CLASS 25: Athletic apparel, namely, shirts, pants, jackets, footwear, hats and caps, athletic uniforms; Clothing, namely, shirts, pants, jackets, footwear, hats and caps, sweatshirts, t-shirts, sweatpants, hoodies

FIRST USE 01-01-2007 ; IN COMMERCE 01-01-2007

CLASS 41: Arranging and conducting youth sports programs in the field of collegiate sports; Encouraging amateur sports and physical education by organizing, sanctioning, conducting, regulating and governing amateur athletic programs and activities; Providing various facilities for an array of sporting events, sports and athletic competitions and awards programmes; Education services in the nature of courses at the university level

FIRST USE 01-01-2007 ; IN COMMERCE 01-01-2007

The mark consists of a profile image of a dragon.

SER. NO. 98-724,683, FILED 08-29-2024

Acting Director of the United States Patent and Trademark Office