

## 1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Tools: One set(s) of specialty tools for assembling signs and replacing variable sign components.

## 1.8 FIELD CONDITIONS

- A. Field Measurements: Verify locations of anchorage devices embedded in permanent construction by other installers by field measurements before fabrication and indicate measurements on Shop Drawings.

## 1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Deterioration of finishes beyond normal weathering.
    - b. Deterioration of embedded graphic image.
    - c. Separation or delamination of sheet materials and components.
  - 2. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" the ABA standards of the Federal agency having jurisdiction and ICC A117.1

### 2.2 ROOM-IDENTIFICATION SIGNS (A1.1)

- A. Provide signage type(s) in accordance with University at Buffalo Signage Standard as established with ASI.
  - 1. Sign Type: A1.1; Framed Room ID with Window.
  - 2. Insert: By Client.
  - 3. Product Code: EBJ/WS-1/390.
  - 4. Size: 6-3/8 by 6-3/8 inches.

- B. Locations: As indicated on Sign Location Plan drawings.

## 2.3 ACCESSORIES

- A. Fasteners and Anchors: Per University at Buffalo Signage Standard.

## 2.4 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
  - 1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
- B. Signs with Changeable Message Capability: Fabricate signs to allow insertion of changeable messages as follows:
  - 1. In accordance with University of Buffalo Signage Standard.

## 2.5 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions and UB Signage Standards.
  - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
  - 2. Install signs so they do not protrude or obstruct according to the accessibility standard.
  - 3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
- B. Accessibility: Install signs in locations on walls and according to the accessibility standard.



C. Mounting Methods:

1. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.

3.2 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 101423.16

**Bill To**  
Client to Provide

**Ship To**  
Client to Provide

**Date Ordered**

**PO#**

**Tax Status** ☒ Exempt ☐ Taxable

**Note:**

- Shipping and/or installation rates will be applied at time of order.

## Customer Support

Your account is proudly serviced by:

### Sales Consultant

Bethany Bernatovicz  
716.775.0104 ext. 5813  
bethany.bernatovicz@asisignage.com

### Project Managers

Terri Hunt  
716.775.0104 ext. 5821  
terri.hunt@asisignage.com

### ASI Buffalo

2957 Alt Boulevard  
Grand Island, NY 14072  
1.800.274.7732  
716.775.3329 Fax  
[www.asisignage.com](http://www.asisignage.com)

Thank you for choosing ASI for your signage needs. Included in this packet is a hard copy of your reorder guide, as well as a pdf version on CD. When you are ready to order, please review the drawings found in your reorder guide and identify the sign type(s) required. You can then either:

- make a copy of the reorder form, fill out the required areas and return it via fax or mail or
- use the provided pdf, fill out the required areas and email the completed form to your customer support team member listed above.

Please be sure to fill out the following areas, making sure to carefully spell, punctuate, and capitalize your message just as it will appear on the sign.

- ☒ Date Ordered
- ☒ Purchase Order #

- ☒ Quantity
- ☒ Message

**Please Note:**

We are a certified Women-Owned Business Enterprise in New York State and Erie County, NY, and a certified Small Business Enterprise in Cuyahoga County, Ohio.

- 1) Standard color for all Interior Signage is White copy on a Flint Grey Background.



**Interior Copy Color**  
SC-901 White



**Interior Background Color**  
SC-913 Flint  
(1:6 ratio SC-901 White to SC-913 Flint)



**Interior Background Color**  
PMS-2935 (new)  
(Libraries and Athletics Only)

- 2) Black graphics are to be used on Building/Complex Names when below the interlocking UB logo.



**UB Logo**  
PMS-2935 (new)



**Building/Complex Name**  
SC-905 Black



**Border**  
SC-914 Lead



Example

- 3) Accent Band



**Campus Standard**  
PMS 2935 Blue (new)

- 4) Additional Finishes [Donor Plaques & Letters]



**Plaques**  
#902 Brushed Aluminum Chemetal



**Letters**  
Satin Aluminum























- 1) Primary Type Style - used for all signage.

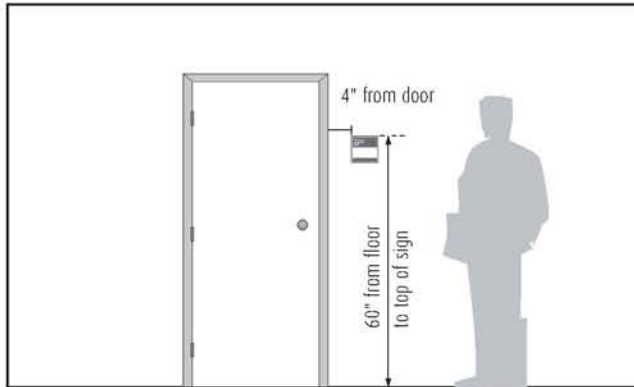
**Kievit Pro Medium**

**ABCDEFGHIJKLMNOPQRSTUVWXYZ**

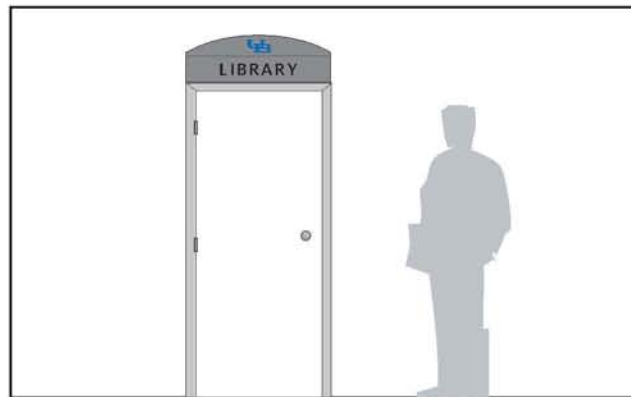
**abcdefghijklmnopqrstuvwxyz**

**!@#\$%^&\*()\_+[]{}/?**

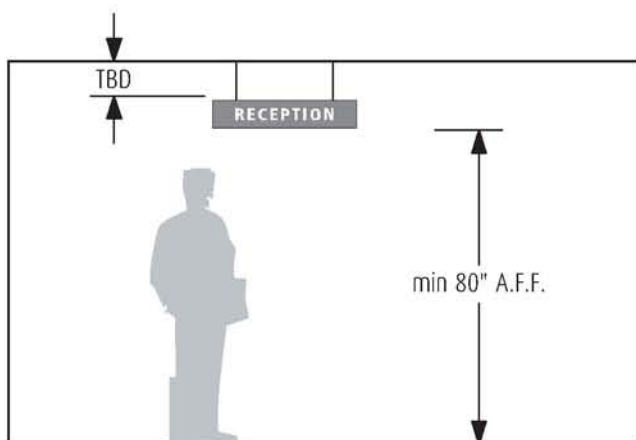
								
(C1.a) Men Accessible	(C1.b) Stairs	(C1.c) Women Accessible	(C1.e) Men	(C1.f) Women	(C1.h) No Exit			
								
(C1.i) All-Gender Restroom	(C1.j) All-Gender/Accessible Restroom	(C1.k) All-Gender/ Accessible/Baby Restroom	(C1.l) All-Gender/ Accessible/Shower Accessible	Hand Washing	(B2.1) In Case of Emergency	(B2.2) No Smoking	(B2.3) Extinguisher	
								
(A1) Left	(A2) 45° Up Left	(A3) Up	(A4) 45° Up Right	(A5) Right	(A6) 45° Down Right	(A7) Down	(A8) 45° Down Left	



Room ID Wall Mounts



Mount flush above door frame



Suspended Overhead  
**Provide ceiling type & height when ordering.**

**Sign Type A1.1**  
**\$64.44**  
(Qty. 101 + \$61.22ea)**ORDERING TIP**

A suction cup is required to insert the Insert. One suction cup included with every (10) signs ordered.



**Classification**  
Framed Room ID with Window  
(insert by client)

**Product Code**  
EBJ/WS-1/390

**Size**  
6-3/8" x 6-3/8"

**Background Color**  
Flint

**Graphics/Copy Color**  
White

**QUANTITY****MESSAGE** - Enter required room number**Sign Type B1.1**  
**\$50.48**

Please Knock  
Before  
Entering

**Classification**  
Informational Wall Mount  
**Product Code**  
SPJ

**Size**  
6-3/8" x 6-3/8"

**Background Color**  
Flint

**Graphics/Copy Color**  
White

**QUANTITY****MESSAGE** - Enter required message**Sign Type B1.2**  
**\$50.48**

Authorized  
Personnel  
Only

**Classification**  
Informational Wall Mount  
**Product Code**  
SPJ

**Size**  
6-3/8" x 6-3/8"

**Background Color**  
Flint

**Graphics/Copy Color**  
White

**QUANTITY****MESSAGE**

No message required

**Sign Type B2.1**  
**\$50.48**

**Classification**  
Informational Wall Mount  
**Product Code**  
SPJ

**Size**  
6-3/8" x 6-3/8"

**Background Color**  
Flint

**Graphics/Copy Color**  
White

**QUANTITY****MESSAGE**

No message required

**Sign Type B2.2**  
**\$50.48**

**Classification**  
Informational Wall Mount  
**Product Code**  
SPJ

**Size**  
6-3/8" x 6-3/8"

**Background Color**  
Flint

**Graphics/Copy Color**  
White

**QUANTITY****MESSAGE**

No message required

**Sign Type B2.3**  
**\$50.48**

**Classification**  
Informational Wall Mount

**Product Code**  
SPJ

**Size**  
6-3/8" x 6-3/8"

**Background Color**  
Flint

**Graphics/Copy Color**  
White

**QUANTITY****MESSAGE**

No message required

**Sign Type B3**  
**\$50.48**

**Classification**  
Level Indicator

**Product Code**  
EBJ

**Size**  
6-3/8" x 6-3/8"

**Background Color**  
Flint

**Graphics/Copy Color**  
White

**QUANTITY****MESSAGE - Enter required floor number****Sign Type C1.a**  
**\$106.33**

**Classification**  
Framed Men/Accessible  
Restroom ID with Room Number

**Product Code**  
EBJ/390

**Size**  
9-3/8" x 6-3/8"

**Background Color**  
Flint

**Graphics/Copy Color**  
White

**QUANTITY****MESSAGE - Enter required room number****Sign Type C1.b**  
**\$106.33**

**Classification**  
Framed Stair ID with Room Number

**Product Code**  
EBJ/390

**Size**  
9-3/8" x 6-3/8"

**Background Color**  
Flint

**Graphics/Copy Color**  
White

**QUANTITY****MESSAGE - Enter required room number****Sign Type C1.c**  
**\$106.33**

**Classification**  
Framed Women/Accessible  
Restroom ID with Room Number

**Product Code**  
EBJ/390






**Size**  
9-3/8" x 6-3/8"

**Background Color**  
Flint

**Graphics/Copy Color**  
White

**QUANTITY****MESSAGE - Enter required room number**



<b>Sign Type C1.e</b> <b>\$106.33</b>	<b>Classification</b> Framed Men Restroom ID with Room Number <b>Product Code</b> EBJ/390 <b>Size</b> 9-3/8" x 6-3/8" <b>Background Color</b> Flint <b>Graphics/Copy Color</b> White	<b>QUANTITY</b> <input type="text"/> <b>MESSAGE - Enter required room number</b> <input type="text"/>
		
<b>Sign Type C1.f</b> <b>\$106.33</b>	<b>Classification</b> Framed Women Restroom ID with Room Number <b>Product Code</b> EBJ/390 <b>Size</b> 9-3/8" x 6-3/8" <b>Background Color</b> Flint <b>Graphics/Copy Color</b> White	<b>QUANTITY</b> <input type="text"/> <b>MESSAGE - Enter required room number</b> <input type="text"/>
		
<b>Sign Type C1.h</b> <b>\$106.33</b>	<b>Classification</b> Framed No Exit ID <b>Product Code</b> EBJ/390 <b>Size</b> 9-3/8" x 6-3/8" <b>Background Color</b> Flint <b>Graphics/Copy Color</b> White	<b>QUANTITY</b> <input type="text"/> <b>MESSAGE</b> *No Message Required
		
<b>Sign Type C1.i</b> <b>\$106.33</b>	<b>Classification</b> Framed All-Gender Restroom ID with Room Number <b>Product Code</b> EBJ/390 <b>Size</b> 9-3/8" x 6-3/8" <b>Background Color</b> Flint <b>Graphics/Copy Color</b> White	<b>QUANTITY</b> <input type="text"/> <b>MESSAGE - Enter required room number</b> <input type="text"/>
		
<b>Sign Type C1.j</b> <b>\$106.33</b>	<b>Classification</b> Framed All-Gender/Accessible Restroom ID with Room Number <b>Product Code</b> EBJ/390 <b>Size</b> 9-3/8" x 6-3/8" <b>Background Color</b> Flint <b>Graphics/Copy Color</b> White	<b>QUANTITY</b> <input type="text"/> <b>MESSAGE - Enter required room number</b> <input type="text"/>
		

**Sign Type C1.k**  
**\$106.33**



**Classification**  
Framed All-Gender/Accessible/Baby  
Restroom ID with Room Number

**Product Code**  
EBJ/390

**Size**  
9-3/8" x 6-3/8"

**Background Color**  
Flint

**Graphics/Copy Color**  
White

**QUANTITY**

**MESSAGE** - Enter required room number

**Sign Type C1.l**  
**\$106.33**



**Classification**  
Framed All-Gender/Accessible/Shower  
Restroom ID with Room Number

**Product Code**  
EBJ/390

**Size**  
9-3/8" x 6-3/8"

**Background Color**  
Flint

**Graphics/Copy Color**  
White

**QUANTITY**

**MESSAGE** - Enter required room number

**Sign Type LS.1**  
**\$230.91**



**Classification**  
Exit/Level ID

**Product Code**  
EBJ

**Size**  
19-7/8" x 18"

**Background Color**  
Flint

**Graphics/Copy Color**  
White

**QUANTITY**

**MESSAGE** - Enter stair and floor numbers

**Sign Type D1**  
**\$74.11**



**Classification**  
Building ID - Arched Top

**Product Code**  
SPJ

**Size**  
4-5/16" x 12-3/8"

**Background Color**  
Flint

**Graphics/Copy Color**  
Logo: Blue, Copy: Black, Border: Lead  
Accent Band: PMS 2935, Blue


**QUANTITY**


**MESSAGE**


Building/Complex:


**ORDERING TIP**


Sign Type D1 should always be ordered with Sign Type D3.  
The text is to be the complex or building only,  
not the department or school name.

<p><b>Sign Type D3</b> <b>\$74.11</b></p> 	<p><b>Classification</b> Directional</p> <p><b>Product Code</b> WS-1</p> <p><b>Size</b> 6-1/4" x 12-3/8"</p> <p><b>Background Color</b> Flint</p> <p><b>Graphics/Copy Color</b> Border: Lead</p>	<p><b>QUANTITY</b></p> <input type="text"/> <p><b>MESSAGE</b></p> <p>*No Message Required</p>
<p><b>ORDERING TIP</b> This sign is an alternate to D2, as it has changeable insert to be provided by client. Please order all D2 or D3, do not mix. Multiple signs may be ordered and stacked under header D1.</p>		

<p><b>Sign Type E1.a</b> <b>\$153.58</b></p> 	<p><b>Classification</b> Area ID - Overhead Wall Mount Arched Top - 1 line of text</p> <p><b>Product Code</b> SPJ</p> <p><b>Size</b> 12" x 36"</p> <p><b>Background Color</b> Flint</p> <p><b>Graphics/Copy Color</b> Logo: Blue, Copy: Black, Border: Lead</p>	<p><b>QUANTITY</b></p> <input type="text"/> <p><b>MESSAGE</b></p>
<p><b>ORDERING TIP</b> To be mounted above a 36" wide door only. Not to be used for suspended ceiling mount. Please ensure that the proper amount is available above the door.</p>		

<p><b>Sign Type E1.b</b> <b>\$273.87</b></p> 	<p><b>Classification</b> Area ID - Overhead Wall Mount Arched Top - 1 line of text</p> <p><b>Product Code</b> SPJ</p> <p><b>Size</b> 17-1/2" x 72"</p> <p><b>Background Color</b> Flint</p> <p><b>Graphics/Copy Color</b> Logo: Blue, Copy: Black, Border: Lead</p>	<p><b>QUANTITY</b></p> <input type="text"/> <p><b>MESSAGE</b></p>
<p><b>ORDERING TIP</b> To be mounted above a 72" wide door only. Not to be used for suspended ceiling mount. Please ensure that the proper amount is available above the door.</p>		

<p><b>Sign Type E2.a</b> <b>\$209.43</b></p> 	<p><b>Classification</b> Area ID - Overhead Wall Mount Arched Top - 2 lines of text</p> <p><b>Product Code</b> SPJ</p> <p><b>Size</b> 16-1/2" x 36"</p> <p><b>Background Color</b> Flint</p> <p><b>Graphics/Copy Color</b> Logo: Blue, Copy: Black, Border: Lead</p>	<p><b>QUANTITY</b></p> <input type="text"/> <p><b>MESSAGE</b></p>
<p><b>ORDERING TIP</b> To be mounted above a 36" wide door only. Not to be used for suspended ceiling mount. Please ensure that the proper amount is available above the door.</p>		

<p><b>Sign Type E2.b</b> <b>\$332.94</b></p> 	<p><b>Classification</b> Area ID - Overhead Wall Mount Arched Top - 2 lines of text</p> <p><b>Product Code</b> SPJ</p> <p><b>Size</b> 22" x 72"</p> <p><b>Background Color</b> Flint</p> <p><b>Graphics/Copy Color</b> Logo: Blue, Copy: Black, Border: Lead</p>	<p><b>QUANTITY</b></p> <input type="text"/> <p><b>MESSAGE</b></p>
<p><b>ORDERING TIP</b> To be mounted above a 72" wide door only. Not to be used for suspended ceiling mount. Please ensure that the proper amount is available above the door.</p>		

	<b>Sign Type F2</b> <b>\$279.24</b>	<b>Classification</b> Building ID - Arched Top with Framed Window - insert by client <b>Product Code</b> SPJ/Mirtec <b>Size</b> 21.2" x 11-1/8" <b>Background Color</b> Flint <b>Graphics/Copy Color</b> Logo: Blue, Copy: Black, Border: Lead Accent Band: PMS 2935 Blue	<b>QUANTITY</b> <input type="text"/>	<b>MESSAGE</b> Building/Complex:
<b>ORDERING TIP</b> Use this sign when looking for a directory. A suction cup is required to pop the acrylic cover out to insert client provided 11" x 17" white insert and will be provided with each order. The text is to be the complex or building only, not the department or school name.				

	<b>Sign Type F3</b> <b>\$547.74</b>	<b>Classification</b> Building ID - Arched Top with Framed Window - inserts by client <b>Product Code</b> SPJ/Mirtec <b>Size</b> 25.2" x 22-1/4" <b>Background Color</b> Flint <b>Graphics/Copy Color</b> Logo: Blue, Copy: Black, Border: Lead Accent Band: PMS 2935 Blue	<b>QUANTITY</b> <input type="text"/>	<b>MESSAGE</b> Building/Complex:
<b>ORDERING TIP</b> Use this sign when looking for a directory. A suction cup is required to pop the acrylic cover out to insert client provided 11" x 17" white insert and will be provided with each order. The text is to be the complex or building only, not the department or school name.				

<b>Sign Type G1.a</b> <b>\$128.88</b>	<b>Classification</b> Area ID - Overhead Wall Mount 1 line of text <b>Product Code</b> SPJ <b>Size</b> 7" x 36" <b>Background Color</b> Flint <b>Graphics/Copy Color</b> Copy: White, Border: Lead	<b>QUANTITY</b> <input type="text"/>	<b>MESSAGE</b>
<b>RECEPTION</b>			
<b>ORDERING TIP:</b> Use this sign for a bldg. ID or informational.			

<b>Sign Type G1.b</b> <b>\$202.99</b>	<b>Classification</b> Area ID - Overhead Wall Mount 1 line of text <b>Product Code</b> SPJ <b>Size</b> 7" x 72" <b>Background Color</b> Flint <b>Graphics/Copy Color</b> Copy: White, Border: Lead	<b>QUANTITY</b> <input type="text"/>	<b>MESSAGE</b>
<b>BIOMEDICAL EDUCATION</b>			
<b>ORDERING TIP:</b> Use this sign for a bldg. ID or informational.			

<b>Sign Type G2.a</b> <b>\$170.77</b>	<b>Classification</b> Area ID - Overhead Wall Mount 2 lines of text <b>Product Code</b> SPJ <b>Size</b> 12" x 36" <b>Background Color</b> Flint <b>Graphics/Copy Color</b> Copy: White, Border: Lead	<b>QUANTITY</b> <input type="text"/>	<b>MESSAGE</b>
<b>CUSTOMER SERVICE</b>			
<b>ORDERING TIP:</b> Use this sign for a bldg. ID or informational.			

**Sign Type G2.b**  
**\$247.02****INFORMATION TECHNOLOGY  
SYSTEMS****ORDERING TIP:** Use this sign for a bldg. ID or informational.**Classification**  
Area ID - Overhead Wall Mount  
2 lines of text  
**Product Code**  
SPJ  
**Size**  
12" x 72"  
**Background Color**  
Flint  
**Graphics/Copy Color**  
Copy: White, Border: Lead**QUANTITY****MESSAGE****Sign Type H1.a**  
**\$202.99****RECEPTION****ORDERING TIP:** Use this sign for a bldg. ID or informational.**Classification**  
Area ID - Overhead Suspended  
Ceiling Mount - 1 line of text  
**Product Code**  
PAP  
**Size**  
7" x 36" x 3/4"  
**Background Color**  
Flint  
**Graphics/Copy Color**  
Copy: White, Border: Lead**QUANTITY****MESSAGE**

Side A:

Side B:

Ceiling type:

Example: Drop Ceiling or Drywall

Ceiling height:

**Sign Type H1.b**  
**\$263.13****BIOMEDICAL EDUCATION****ORDERING TIP:** Use this sign for a bldg. ID or informational.**Classification**  
Area ID - Overhead Suspended  
Ceiling Mount - 1 line of text  
**Product Code**  
PAP  
**Size**  
7" x 72" x 3/4"  
**Background Color**  
Flint  
**Graphics/Copy Color**  
Copy: White, Border: Lead**QUANTITY****MESSAGE**

Side A:

Side B:

Ceiling type:

Example: Drop Ceiling or Drywall

Ceiling height:

**Sign Type H2.a**  
**\$236.28****CUSTOMER  
SERVICE****ORDERING TIP:** Use this sign for a bldg. ID or informational.**Classification**  
Area ID - Overhead Suspended  
Ceiling Mount - 2 lines of text  
**Product Code**  
PAP  
**Size**  
12" x 36" x 3/4"  
**Background Color**  
Flint  
**Graphics/Copy Color**  
Copy: White, Border: Lead**QUANTITY****MESSAGE**

Side A:

Side B:

Ceiling type:

Example: Drop Ceiling or Drywall

Ceiling height:

**Sign Type H2.b**  
**\$311.46****INFORMATION TECHNOLOGY  
SYSTEMS****ORDERING TIP:** Use this sign for a bldg. ID or informational.**Classification**  
Area ID - Overhead Suspended  
Ceiling Mount - 2 lines of text  
**Product Code**  
PAP  
**Size**  
12" x 72" x 3/4"  
**Background Color**  
Flint  
**Graphics/Copy Color**  
Copy: White, Border: Lead**QUANTITY****MESSAGE**

Side A:

Side B:

Ceiling type:

Example: Drop Ceiling or Drywall

Ceiling height:



**Sign Type I1.a**  
**\$142.84**

RECEPTION

**Classification**Directional - Overhead Wall Mount  
1 line of text with arrow**Product Code**

SPJ

**Size**

7" x 36"

**Background Color**

Flint

**Graphics/Copy Color**

Copy/Arrow: White, Border: Lead

**QUANTITY****MESSAGE****Sign Type I1.b**  
**\$208.36**

BIOMEDICAL EDUCATION

**Classification**Directional - Overhead Wall Mount  
1 line of text with arrow**Product Code**

SPJ

**Size**

7" x 72"

**Background Color**

Flint

**Graphics/Copy Color**

Copy/Arrow: White, Border: Lead

**QUANTITY****MESSAGE****Sign Type I2.a**  
**\$170.77**CUSTOMER  
SERVICE**Classification**Directional - Overhead Wall Mount  
2 lines of text with arrow**Product Code**

SPJ

**Size**

12" x 36"

**Background Color**

Flint

**Graphics/Copy Color**

Copy/Arrow: White, Border: Lead

**QUANTITY****MESSAGE****Sign Type I2.b**  
**\$257.76**INFORMATION TECHNOLOGY  
SYSTEMS**Classification**Directional - Overhead Wall Mount  
2 lines of text with arrow**Product Code**

SPJ

**Size**

12" x 72"

**Background Color**

Flint

**Graphics/Copy Color**

Copy/Arrow: White, Border: Lead

**QUANTITY****MESSAGE****Sign Type J1.a**  
**\$202.99**

RECEPTION

**Classification**Directional - Overhead Suspended  
Ceiling Mount - 1 line of text with arrow**Product Code**

PAP

**Size**

7" x 36" x 3/4"

**Background Color**

Flint

**Graphics/Copy Color**

Copy/Arrow: White, Border: Lead

**QUANTITY****MESSAGE**

Side A:

Side B:

Ceiling Type:

Example: Drop Ceiling or Drywall

Ceiling Height:

<p><b>Sign Type J1.b</b> <b>\$273.87</b></p> <p><b>BIOMEDICAL EDUCATION</b></p>	<p><b>Classification</b> Directional - Overhead Suspended Ceiling Mount - 1 line of text with arrow</p> <p><b>Product Code</b> PAP</p> <p><b>Size</b> 7" x 72" x 3/4"</p> <p><b>Background Color</b> Flint</p> <p><b>Graphics/Copy Color</b> Copy/Arrow: White, Border: Lead</p>	<p><b>QUANTITY</b> <input type="text"/></p> <p><b>MESSAGE</b></p> <p>Side A:</p> <p>Side B:</p> <p>Ceiling Type: Example: Drop Ceiling or Drywall</p> <p>Ceiling Height:</p>
<p><b>Sign Type J2.a</b> <b>\$230.91</b></p> <p><b>CUSTOMER SERVICE</b></p>	<p><b>Classification</b> Directional - Overhead Suspended Ceiling Mount - 2 lines of text with arrow</p> <p><b>Product Code</b> PAP</p> <p><b>Size</b> 12" x 36" x 3/4"</p> <p><b>Background Color</b> Flint</p> <p><b>Graphics/Copy Color</b> Copy/Arrow: White, Border: Lead</p>	<p><b>QUANTITY</b> <input type="text"/></p> <p><b>MESSAGE</b></p> <p>Side A:</p> <p>Side B:</p> <p>Ceiling Type: Example: Drop Ceiling or Drywall</p> <p>Ceiling Height:</p>
<p><b>Sign Type J2.b</b> <b>\$311.46</b></p> <p><b>INFORMATION TECHNOLOGY SYSTEMS</b></p>	<p><b>Classification</b> Directional - Overhead Suspended Ceiling Mount - 2 lines of text with arrow</p> <p><b>Product Code</b> PAP</p> <p><b>Size</b> 12" x 72" x 3/4"</p> <p><b>Background Color</b> Flint</p> <p><b>Graphics/Copy Color</b> Copy/Arrow: White, Border: Lead</p>	<p><b>QUANTITY</b> <input type="text"/></p> <p><b>MESSAGE</b></p> <p>Side A:</p> <p>Side B:</p> <p>Ceiling Type: Example: Drop Ceiling or Drywall</p> <p>Ceiling Height:</p>
<p><b>Sign Type LPS 2</b> <b>Contact ASI for Pricing</b></p> <p><b>FIREFLY CONFERENCE ROOM</b></p>	<p><b>Classification</b> Aluminum Letters</p> <p><b>Product Code</b> LPS</p> <p><b>Size</b> 2" x 3/16" thick Length &amp; width will vary</p> <p><b>Background Color</b> n/a</p> <p><b>Graphics/Copy Color</b> Satin Aluminum Finish</p>	<p><b>QUANTITY</b> <input type="text"/></p> <p><b>MESSAGE</b></p>
<p><b>Sign Type LPS 3</b> <b>Contact ASI for Pricing</b></p> <p><b>BANSAL ATRIUM</b></p>	<p><b>Classification</b> Aluminum Letters</p> <p><b>Product Code</b> LPS</p> <p><b>Size</b> 3" x 1/4" thick Length &amp; width will vary</p> <p><b>Background Color</b> n/a</p> <p><b>Graphics/Copy Color</b> Satin Aluminum Finish</p>	<p><b>QUANTITY</b> <input type="text"/></p> <p><b>MESSAGE</b></p>

<p><b>Suction Cup</b> <b>\$4.30</b></p> <p><b>ORDERING TIP</b> A suction cup is required to insert the paper insert for Sign Type A1.1. If the order has greater than or equal to (10) signs, (1) suction cup is included at no charge. Additional suction cups to be ordered here.</p>	<p><b>QUANTITY</b> <input type="text"/></p> <p><b>MESSAGE</b> <div>No message required</div></p>
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## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Corner guards.
2. Abuse-resistant wall coverings.

### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.
2. Include fire ratings of units recessed in fire-rated walls and listings for door-protection items attached to fire-rated doors.

B. Shop Drawings: For each type of wall and door protection showing locations and extent.

1. Include plans, elevations, sections, and attachment details.

C. Samples for Initial Selection: For each type of impact-resistant wall-protection unit indicated, in each color and texture specified.

1. Include Samples of accent strips and accessories to verify color selection.

D. Samples for Verification: For each type of exposed finish on the following products, prepared on Samples of size indicated below:

1. Corner and End-Wall Guards: 12 inches long. Include example top caps.
2. Abuse-Resistant Wall Covering: 6 by 6 inches square.

### 1.3 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

### 1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of wall and door protection product to include in maintenance manuals.

1. Include recommended methods and frequency of maintenance for maintaining best condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to finishes and performance.

#### 1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  1. Corner-Guard Covers: Full-size plastic covers of maximum length equal to 2 percent of each type, color, and texture of cover installed, but no fewer than two, 48-inch- long units.
  2. Mounting and Accessory Components: Amounts proportional to the quantities of extra materials. Package mounting and accessory components with each extra material.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store wall and door protection in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
  1. Maintain room temperature within storage area at not less than 70 deg F during the period plastic materials are stored.
  2. Keep plastic materials out of direct sunlight.
  3. Store plastic wall- and door-protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F.
    - a. Store corner-guard covers in a vertical position.

#### 1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of wall- and door-protection units that fail in materials or workmanship within specified warranty period.
  1. Failures include, but are not limited to, the following:
    - a. Structural failures including detachment of components from each other or from the substrates, delamination, and permanent deformation beyond normal use.
    - b. Deterioration of metals, metal finishes, plastics, and other materials beyond normal use.
  2. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 SOURCE LIMITATIONS

- A. Obtain wall- and door-protection products of each type from single source from single manufacturer.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Surface Burning Characteristics: Comply with ASTM E84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame-Spread Index: 25 or less.
  - 2. Smoke-Developed Index: 450 or less.
- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1.

### 2.3 CORNER GUARDS

- A. Surface-Mounted, Plastic-Cover Corner Guards (CG-1): Manufacturer's standard assembly consisting of snap-on, resilient plastic cover installed over retainer; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Construction Specialties, Inc.; Acrovyn Corner Guards or comparable product by one of the following:
    - a. Inpro Corporation
    - b. Koroseal Interior Products, LLC
    - c. Or approved equal
  - 2. Style: SSM-20AN
  - 3. Cover: Extruded rigid plastic, minimum 0.078-inch wall thickness; as follows:
    - a. Profile: Nominal 2-inch- long leg and 1/4-inch corner radius.
    - b. Height: As indicated on Drawings.
    - c. Color and Texture: As indicated on Drawings.
  - 4. Continuous Retainer: Minimum 0.060-inch- thick, one-piece, extruded aluminum.
  - 5. Retainer Clips: Manufacturer's standard impact-absorbing clips.
  - 6. Top and Bottom Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.

## 2.4 ABUSE-RESISTANT WALL COVERINGS

- A. Abuse-Resistant Sheet Wall Covering (WP-1): Fabricated from semirigid, plastic sheet wall-covering material.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Construction Specialties, Inc.; Acrovyn Wall Protection or comparable product by one of the following:
    - a. Inpro Corporation
    - b. Koroseal Interior Products, LLC
    - c. Or approved equal
  - 2. Size: 48 by 96 inches for sheet.
  - 3. Sheet Thickness: 0.040 inch.
  - 4. Color and Texture: As indicated on Drawings.
  - 5. Height: As indicated.
  - 6. Trim and Joint Moldings: Extruded rigid plastic that matches wall-covering color.
  - 7. Mounting: Adhesive.

## 2.5 MATERIALS

- A. Plastic Materials: Chemical- and stain-resistant, high-impact-resistant plastic with integral color throughout; extruded and sheet material as required, thickness as indicated.
- B. Polycarbonate Plastic Sheet: ASTM D6098, S-PC01, Class 1 or Class 2, abrasion resistant; with a minimum impact-resistance rating of 15 ft.-lbf/in. of notch when tested according to ASTM D256, Test Method A.
- C. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.
- D. Adhesive: As recommended by protection product manufacturer.

## 2.6 FABRICATION

- A. Fabricate wall and door protection according to requirements indicated for design, performance, dimensions, and member sizes, including thicknesses of components.
- B. Factory Assembly: Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.
- C. Quality: Fabricate components with uniformly tight seams and joints and with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

## 2.7 FINISHES

- A. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine walls to which wall and door protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.
  - 1. For wall and door protection attached with adhesive, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Complete finishing operations, including painting, before installing wall and door protection.
- B. Before installation, clean substrate to remove dust, debris, and loose particles.

### 3.3 INSTALLATION

- A. Installation Quality: Install wall and door protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
- B. Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.
  - 1. Provide anchoring devices and suitable locations to withstand imposed loads.
  - 2. Where splices occur in horizontal runs of more than 20 feet, splice aluminum retainers and plastic covers at different locations along the run, but no closer than 12 inches apart.
  - 3. Adjust end and top caps as required to ensure tight seams.

- C. Abuse-Resistant Wall Covering: Install top and edge moldings, and corners as required for a complete installation. Vertical seams between panels shall tightly abut and be finished with clear sealant.

#### 3.4 CLEANING

- A. Immediately after completion of installation, clean plastic covers and accessories using a standard ammonia-based household cleaning agent.
- B. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION 102600

## PART 1 - GENERAL

### 1.1 SUMMARY

#### A. Section Includes:

1. Constant volume fume hoods.

#### B. Related Requirements:

1. Section 230593 "Testing, Adjusting, and Balancing for HVAC" for field quality-control testing of fume hoods.
2. Section 230923 "Direct Digital Control (DDC) System for HVAC" for VAV controls for fume hood exhaust.

### 1.2 PREINSTALLATION MEETINGS

- #### A. Preinstallation Conference: Conduct conference at Project site.

### 1.3 COORDINATION

- #### A. Coordinate layout and installation of framing and reinforcements for lateral support of fume hoods.
- #### B. Coordinate installation of fume hoods with laboratory casework and other laboratory equipment.

### 1.4 ACTION SUBMITTALS

- #### A. Product Data: For each type of product.

- #### B. Shop Drawings: For laboratory fume hoods.

1. Include plans, elevations, sections, and attachment details.
2. Indicate details for anchoring fume hoods to permanent building construction including locations of blocking and other supports.
3. Indicate locations and types of service fittings together with associated service supply connection required.
4. Indicate duct connections, electrical connections, and locations of access panels.
5. Include roughing-in information for mechanical, plumbing, and electrical connections.
6. Show adjacent walls, doors, windows, other building components, laboratory casework, and other laboratory equipment. Indicate clearances from the above items.
7. Include layout of fume hoods in relation to lighting fixtures and air-conditioning registers and grilles.

- 8. Include coordinated dimensions for laboratory equipment specified in other Sections.

- C. Samples: For fume hood exterior finishes epoxy work tops.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Showing compliance with specified performance requirements for as-manufactured containment and static pressure loss, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency.
- B. Source quality-control reports.

## 1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish complete touchup kit for each type and color of fume hood finish provided. Include fillers, primers, paints, and other materials necessary to perform permanent repairs to damaged fume hood finish.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect finished surfaces during handling and installation with protective covering of polyethylene film or another suitable material.

## 1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install fume hoods until building is enclosed, wet work and utility roughing-in are complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Locate concealed framing, blocking, and reinforcements that support fume hoods by field measurements before being enclosed, and indicate measurements on Shop Drawings.

## PART 2 - PRODUCTS

### 2.1 SOURCE LIMITATIONS

- A. Obtain laboratory fume hoods from single manufacturer.
- B. Obtain laboratory fume hoods from same source as laboratory casework.



- C. Product Designations: Drawings indicate sizes, types, and configurations of fume hoods by referencing designated manufacturer's catalog numbers. Other manufacturers' fume hoods of similar sizes, types, and configurations, and complying with the Specifications, may be considered.

## 2.2 PERFORMANCE REQUIREMENTS

- A. Containment: Provide fume hoods that comply with the following when tested according to ASHRAE 110:
  - 1. As-Manufactured (AM) Rating: AM 0.05 (0.05 ppm).
  - 2. Average Face Velocity: 100 fpm plus or minus 10 percent with sashes fully open.
  - 3. Sash Position: Fully open.
    - a. Test hoods with horizontal sashes with maximum opening on one side, with maximum opening in the center, and with one opening at each side equal to half of maximum opening.
    - b. Test hoods with combination sashes fully raised, with maximum opening on one side, with maximum opening in the center, and with one opening at each side equal to half of maximum opening.
  - 4. Release Rate: 4.0 L/min.
- B. Static-Pressure Loss: Not more than 1/2-inch wg at 100-fpm face velocity with sash fully open when measured at four locations 90 degrees apart around the exhaust duct and at least three duct diameters downstream from duct collar.

## 2.3 FUME HOODS, GENERAL

- A. Product Standards: Comply with SEFA 1, "Laboratory Fume Hoods - Recommended Practices." Provide fume hoods UL listed and labeled for compliance with UL 1805.
- B. Constant Volume Fume Hoods: Provide constant volume fume hoods without bypass.
- C. VAV Control: Equip fume hoods with an electronic control unit with a sensing device that monitors face velocity, and a motorized damper on the exhaust connection that maintains a constant face velocity by controlling air volume in response to control unit. Equip units with manual override switch that opens motorized damper to provide maximum exhaust capacity regardless of sash position.
  - 1. Provide electronic control unit that also monitors sash position and anticipates changes in face velocity caused by abrupt changes in sash position.

## 2.4 CONSTANT VOLUME FUME HOODS

- A. Description: Constant volume fume hoods are sometimes called "conventional fume hoods." If VAV control is not used, face velocity increases as sash is closed.

B. Constant Volume Fume Hoods with VAV Control and Steel Exterior:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Labconco, Protector XL Fume Hood; Remote Blower or comparable product by one of the following:
  - a. Mott Manufacturing Ltd
  - b. Lab Design by Fenco Solutions
  - c. Fisher American

2.5 MATERIALS

- A. Steel Sheet: Cold-rolled, commercial steel (CS) sheet, complying with ASTM A1008/A1008M; matte finish; suitable for exposed applications.
- B. Polypropylene: Unreinforced polypropylene complying with ASTM D4101, Group 01, Class 1, Grade 2.
- C. Glass: Clear, tempered glass complying with ASTM C1036.
  1. Safety Glass: Provide products complying with testing requirements in 16 CFR 1201 for Category II materials.
  2. Permanently mark safety glass with certification label of the manufacturer. Label to indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- D. Fasteners: Provide stainless steel fasteners where exposed to fumes.

2.6 FABRICATION

- A. General: Assemble fume hoods in factory to greatest extent possible. Disassemble fume hoods only as necessary for shipping and handling limitations. Fume hoods to be capable of being partly disassembled as necessary to permit movement through a 35-by-79-inch door opening.
- B. Steel Exterior: Fabricate from steel sheet, 0.048 inch thick, with component parts screwed together to allow removal of end panels, front fascia, and airfoil and to allow access to plumbing lines and service fittings. Apply chemical-resistant finish to interior and exterior surfaces of component parts before assembly.
- C. Ends: Fabricate with double-wall end panels without projecting corner posts or other obstructions to interfere with smooth, even airflow. Close area between double walls at front of fume hood and as needed to house sash counterbalance weights, utility lines, and remote-control valves.
- D. Splay top and sides of face opening to provide an aerodynamic shape to ensure smooth, even flow of air into fume hood.

- E. Interior Lining: Provide the following unless otherwise indicated:
  - 1. Glass-fiber-reinforced polyester, not less than 3/16 inch thick.
  - 2. Stainless steel, not less than 0.050 inch thick.
- F. Molded Glass-Fiber-Reinforced Polyester Lining: Molded unit consisting of end panels, back panel, preset rear baffle, and top bonded together into a single piece; reinforced to form a rigid assembly to which exterior is attached.
  - 1. Punch fume hood lining side panels to receive service fittings and remote controls. Provide removable plug buttons for holes not used for indicated fittings.
- G. Rear Baffle: Unless otherwise indicated, provide baffle, of same material as fume hood lining, at rear of hood with openings at top and bottom. Secure baffle to cleats at rear of hood with stainless steel screws. Fabricate baffle for easy removal for cleaning behind baffle.
  - 1. Provide preset baffles unless otherwise indicated.
- H. Exhaust Plenum: Full width of fume hood and with adequate volume to provide uniform airflow from hood, of same material as hood lining, and with duct stub for exhaust connection.
  - 1. Duct-Stub Material: glass-fiber-reinforced polyester.
- I. Sashes: Provide operable sashes of type indicated.
  - 1. Fabricate from 0.048-inch- thick steel sheet, with chemical-resistant finish. Form into four-sided frame with bottom corners welded and finished smooth. Make top member removable for glazing replacement. Set glazing in chemical-resistant, U-shaped gaskets.
  - 2. Glaze with laminated safety glass.
  - 3. Counterbalance vertical-sliding sash with sash weight and stainless steel cable system to hold sash in place regardless of position. Provide ball-bearing sheaves, plastic glides in stainless steel guides, and stainless steel lift handles. Provide rubber bumpers at top and bottom of each sash unit.
  - 4. Fabricate horizontal-sliding sashes hung from adjustable nylon-tired, ball-bearing sheaves supported on an overhead stainless steel track. Provide a lower track for guiding sashes only. Sashes to bypass and be removable. Provide flush finger pulls and rubber bumpers at both stiles of each sash.
- J. Airfoil: Unless otherwise indicated, provide airfoil at bottom of fume hood face opening with 1-inch space between airfoil and work top. Sash closes on top of airfoil, leaving 1-inch opening for air intake. Airfoil directs airflow across work top to remove heavier-than-air gases and to prevent reverse airflow.
- K. Light Fixtures: Provide vaporproof, two-tube, rapid-start, fluorescent light fixtures, of longest practicable length; complete with tubes at each fume hood. Shield tubes from hood interior with 1/4-inch- thick laminated glass or 3-mm-thick tempered glass, sealed into hood with chemical-resistant rubber gaskets. Provide units with fluorescent tubes easily replaceable from outside of fume hood.

1. Provide fluorescent tubes with color temperature of 3500 K and minimum color-rendering index of 85.
- L. Filler Strips: Provide as needed to close spaces between fume hoods or fume hood base cabinets and adjacent building construction. Fabricate from same material and with same finish as fume hoods or fume hood base cabinets, as applicable.
- M. Comply with requirements in other Sections for installing water and laboratory gas service fittings, piping, electrical devices, and wiring. Install according to Shop Drawings. Securely anchor fittings, piping, and conduit to fume hoods unless otherwise indicated.

## 2.7 FUME HOOD SYSTEMS

- A. Comply with Provide metal base cabinets in finish matching fume hood exterior finish.
- B. Work Tops: Epoxy.
  1. Work-Top Configuration: Raised (marine) edge with beveled edge and corners.
  2. Where acid storage cabinets are indicated beneath fume hoods, provide holes in work tops as need to accommodate cabinet vents.
  3. Where epoxy sinks occur in epoxy work tops, provide integral sinks bonded to tops with invisible joint line.
- C. Cup Sinks: Polypropylene, 3-by-6-inch oval.
  1. Provide with polypropylene strainers and integral tailpieces.
- D. Fume Hood Base Stands: Welded steel tubing legs, not less than 2 inches square with channel stretchers and aprons. Weld or bolt stretchers to legs and cross-stretchers, and bolt legs to aprons. Provide leveling device welded to bottom of each leg.
  1. Structural Performance except for Fume Hood Base Stands for Radioisotope Hoods: Capable of withstanding 50-lb/ft. work top, 75 lb/ft. on work top, plus weight of hood, without permanent deformation or excessive deflection.
  2. Structural Performance of Fume Hood Base Stands for Radioisotope Hoods: Capable of withstanding 50-lb/ft. work top, 200 lb/ft. on work top, plus weight of hood, without permanent deformation or excessive deflection.
  3. Knee Space: Provide clear floor space not less than 36 inches wide by 25 inches deep by 27 inches high within fume hood base stands unless otherwise indicated.
  4. Leg Shoes: Satin-finished stainless steel, open-bottom, slip-on type.

## 2.8 CHEMICAL-RESISTANT FINISH

- A. General: Prepare, treat, and finish welded assemblies after welding. Prepare, treat, and finish components that are to be assembled with mechanical fasteners before assembling. Prepare, treat, and finish concealed surfaces same as exposed surfaces.

- B. Preparation: Clean steel surfaces, other than stainless steel, of mill scale, rust, oil, and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it.
- C. Chemical-Resistant Finish: Immediately after cleaning and pretreating, apply fume hood manufacturer's standard two-coat, chemical-resistant, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.
  - 1. Chemical and Physical Resistance of Finish System: Finish complies with acceptance levels of cabinet surface finish tests in SEFA 8M. Acceptance level for chemical spot test to be no more than four Level 3 conditions.
  - 2. Colors for Fume Hood Finish: As selected by Architect from manufacturer's full range.

## 2.9 ACCESSORIES

- A. Airflow Indicator: Provide each fume hood with airflow indicator of the following indicator type:
  - 1. Thermal anemometer that measures fume hood face velocity and displays data as digital readout.
- B. Airflow Alarm: Provide fume hoods with audible and visual alarm that activates when airflow sensor reading is outside of preset range.
  - 1. Provide with thermal-anemometer airflow sensor.
  - 2. Provide with reset and test switches.
  - 3. Provide with switch that silences audible alarm and automatically resets when airflow returns to within preset range.
- C. Sash Stops: Provide fume hoods with sash stops to limit hood opening to 50 percent of sash height. Sash stops can be manually released to open sash fully for cleaning fume hood and for placing large apparatus within fume hood.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of fume hoods.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. General: Install fume hoods according to manufacturer's written instructions. Install level, plumb, and true; shim as required, using concealed shims, and securely anchor to building and adjacent laboratory casework. Securely attach access panels but provide for easy removal and secure reattachment. Where fume hoods abut other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.
- B. Comply with requirements in Section 123553.16 "Plastic-Laminate-Clad Laboratory Casework" for installing fume hood base cabinets, work tops, and sinks.
- C. Comply with requirements for installing water and laboratory gas service fittings and electrical devices.
  - 1. Install fittings according to Shop Drawings, installation requirements in SEFA 2.3, and manufacturer's written instructions. Set bases and flanges of sink and work top-mounted fittings in sealant recommended by manufacturer of sink or work-top material. Securely anchor fittings to fume hoods unless otherwise indicated.

### 3.3 FIELD QUALITY CONTROL

- A. Field test installed fume hoods according to ASHRAE 110 as modified in "Performance Requirements" Article to verify compliance with performance requirements.
  - 1. Adjust fume hoods, hood exhaust fans, and building's HVAC system, or replace hoods and make other corrections until tested hoods perform as specified.
  - 2. After making corrections, retest fume hoods that failed to perform as specified.

### 3.4 ADJUSTING AND CLEANING

- A. Adjust moving parts for smooth, near silent, accurate sash operation with one hand. Adjust sashes for uniform contact of rubber bumpers. Verify that counterbalances operate without interference.
- B. Clean finished surfaces, including both sides of glass; touch up as required; and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.

### 3.5 FUME HOOD SCHEDULE

- A. Bench-Top Fume Hood: Type FH-1A, FH-1B, FH-1C, and FH-1D.
  - 1. Exterior: Steel with chemical-resistant finish.
  - 2. Ventilation Type: Constant volume, with VAV control.
  - 3. ASHRAE 110 As-Manufactured (AM) Rating: AM 0.05 (0.05 ppm).
  - 4. Sash Configuration:

- a. Operation:
    - 1) Vertical-sliding, single-hung sash.
  - b. Opening Height: 27 to 30 inches.
5. Work Top: Epoxy.
6. Cup Sinks: Polypropylene, 3-by-6-inch oval.
7. Service Fittings:
- a. Water: Two remote-control, rigid, gooseneck, single-service faucet(s) with vacuum breaker and removable serrated outlet.
  - b. Laboratory Gas for Air Gas (Fuel Gas) Vacuum: Two flange-type fitting(s) with straight outlet and remote-control ground-key cock.
  - c. Electrical: Two duplex receptacles at both end(s) of hood, mounted on exterior front face of end pilaster.
    - 1) Provide GFCI receptacles.

END OF SECTION 115313

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Manually operated, single-roller shades.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood blocking and grounds for mounting roller shades and accessories.

### 1.2 ACTION SUBMITTALS

A. Product Data:

1. For each type of product.
  - a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings:

1. Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.

C. Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type and color of shadeband material and for each type of exposed finish.

1. Include Samples of accessories involving color selection.

D. Samples for Verification: Actual sample of finished products for each type of roller shade including actual shadeband material and installation accessories.

1. Size: Manufacturers' standard size.

E. Product Schedule: For roller shades. Use same designations indicated on Drawings.

### 1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of shadeband material.

B. Product Test Reports: For each type of shadeband material, for tests performed by a qualified testing agency.



- C. Qualification Statements: For Installer.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For roller shades.

#### 1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Extra Stock Material: Furnish extra materials, from the same production run, to Owner that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Roller Shades: Full-size units equal to 3 percent of quantity installed for each size, color, and shadeband material indicated, but no fewer than two units. Include mounting accessories.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

#### 1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

#### 1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of products that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
  - a. Defects in materials and workmanship beyond normal wear and tear.
  - b. Faulty operation of operating system components.
  - c. Deterioration of fabric beyond normal use.
2. Warranty Period:
  - a. Roller Window Shades: 25 year(s) from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 SOURCE LIMITATIONS

- A. Obtain roller shades from single source from single manufacturer.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Window Covering Safety Standard: Provide roller window shades that comply with WCMA A100.1 and are listed and labeled as "Best for Kids" by a qualified testing agency.
- B. Fire Performance: Tested in accordance with and meeting the flame propagation performance criteria of Test 1 or Test 2, as appropriate, of NFPA 701; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- C. Accessibility Standards: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1 for roller window shades designated as accessible.

### 2.3 MANUALLY OPERATED ROLLER WINDOW SHADES

- A. Manually Operated, Single-Roller Shades: For interior use in rectangular openings.
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Draper, Inc.
    - b. Hunter Douglas Architectural Window Coverings
    - c. MechoShade Systems, LLC
  2. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.

- a. Roller Drive-End Location: Right side of interior face of shade.
  - b. Direction of Shadeband Roll: Regular, from back (exterior face) of roller.
  - c. Shadeband-to-Roller Attachment: Manufacturer's standard method.
3. Shadebands:
- a. Shadeband Material: Light-filtering fabric.
  - b. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
    - 1) Type: Enclosed in sealed pocket of shadeband material.
    - 2) Color and Finish: As selected by Architect from manufacturer's full range.
4. Mounting Hardware: Brackets or endcaps, with endcap covers where exposed, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and installation location and conditions indicated.
5. Installation Accessories:
- a. Front Fascia: Aluminum extrusion that conceals front and underside of roller and shadeband assembly and attaches to roller endcaps without exposed fasteners.
    - 1) Shape: L-shaped.
    - 2) Height: Manufacturer's standard height required to conceal roller and shadeband assembly when shade is fully open, but not less than 3 inches.
  - b. Closure Panel and Wall Clip: Removable aluminum panel designed for installation at bottom of site-constructed ceiling recess or pocket and for snap-in attachment to wall clip without fasteners.
  - c. Installation Accessories Color and Finish: As selected from manufacturer's full range.

## 2.4 MANUAL OPERATION

### A. Manual Corded Operation:

- 1. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.
  - a. Bead Chains: Manufacturer's standard bead chain with WCMA A100.1 compliant tension device installed on roller window shade by manufacturer and mounted on jamb.
    - 1) Loop Length: Full length of roller shade.
    - 2) Limit Stops: Provide upper and lower ball stops.
  - b. Spring Lift-Assist Mechanisms: Manufacturer's standard for balancing roller shade weight and for lifting heavy roller shades.

- 1) Provide for shadebands that weigh more than 10 lb or for shades as recommended by manufacturer, whichever criterion is more stringent.

## 2.5 SHADEBAND MATERIALS

- A. Light-Filtering Fabric: Woven fabric, stain and fade resistant.
  1. Source: Roller shade manufacturer.
  2. Type: Woven PVC-coated fiberglass and PVC-coated polyester.
  3. Weave: Basketweave.
  4. Openness Factor: 1 percent.
  5. Color: As selected by Architect from manufacturer's full range.

## 2.6 FABRICATION OF ROLLER WINDOW SHADES

- A. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:
  1. Outside of Jamb Installation: Width and length as indicated on Drawings, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
- B. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible, except as follows:
  1. Vertical Shades: Where width-to-length ratio of shadeband is equal to or greater than 1:4, provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.
  2. Railroaded Materials: Railroad material where material roll width is less than the required width of shadeband and where indicated. Provide battens and seams as required by railroaded material to produce shadebands with full roll-width panel(s) plus, if required, one partial roll-width panel located at top of shadeband.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION OF ROLLER WINDOW SHADES

- A. Install roller shades level, plumb, aligned and centered on openings, and aligned with adjacent units in accordance with manufacturer's written instructions.
  - 1. Located so shadeband is not closer than 2 inches to interior face of glass. Allow clearances for window operation hardware.
- B. Roller Shade Locations: At exterior windows.

### 3.3 ADJUSTING

- A. Adjust and balance roller window shades to operate smoothly, easily, safely, and free from binding or malfunction through full operational range.

### 3.4 CLEANING AND PROTECTION

- A. Clean roller window shade surfaces, after installation, in accordance with manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller window shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION 122413

## PART 1 - GENERAL

### 1.1 SUMMARY

#### A. Section Includes:

1. Metal laboratory casework.
2. Auxiliary cabinets.
3. Countertops.
4. Laboratory accessories.
5. Water and laboratory gas service fittings.
6. Electrical and communication service fittings.

#### B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood blocking for anchoring laboratory casework.
2. Section 092216 "Non-Structural Metal Framing" for reinforcements in metal-framed partitions for anchoring laboratory casework.
3. Section 096513 "Resilient Base and Accessories" for resilient base applied to laboratory casework.
4. Section 115313 "Laboratory Fume Hoods" for fume hoods.

### 1.2 PREINSTALLATION MEETINGS

- #### A. Preinstallation Conference: Conduct conference at Project site.

### 1.3 COORDINATION

- #### A. Coordinate layout and installation of framing and reinforcements for support of laboratory casework.
- #### B. Coordinate installation of laboratory casework with installation of laboratory equipment.

### 1.4 ACTION SUBMITTALS

- #### A. Product Data: For each type of product.
- #### B. Shop Drawings: For laboratory casework.
1. Include plans, elevations, sections, and attachments to other work including blocking and reinforcements required for installation.
  2. Indicate types and sizes of casework.
  3. Indicate manufacturer's catalog numbers for casework.

4. Show fabrication details, including types and locations of hardware.
5. Indicate locations and types of service fittings.
6. Include details of support framing system.
7. Include details of exposed conduits, if required, for service fittings.
8. Indicate locations of and clearances from adjacent walls, doors, windows, other building components, and laboratory equipment.
9. Include coordinated dimensions for laboratory equipment specified in other Sections.

C. Samples: For casework finishes and materials requiring color selection.

D. Samples for Initial Selection: For casework finishes and materials requiring color selection.

#### 1.5 INFORMATIONAL SUBMITTALS

A. Product Test Reports:

1. Casework: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating compliance of laboratory casework with requirements of specified product standard and system structural performance specified in "Performance Requirements" Article.
2. Countertop Surface Material: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating compliance of laboratory countertop surface material with requirements specified for chemical and physical resistance.

#### 1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish complete touchup kit for each type and color of casework finish provided. Include fillers, primers, paints, and other materials necessary to perform permanent repairs to damaged laboratory casework finish.

B. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Cabinet Mounting Clips and Related Hardware: Quantity equal to 5 percent of amount installed, but no fewer than 20 of each type.

#### 1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that produces casework of types indicated for this Project that has been tested for compliance with SEFA 8 M.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect finished surfaces during handling and installation with protective covering of polyethylene film or other suitable material.

## 1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install laboratory casework until building is enclosed, utility roughing-in and wet-work are complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.
- B. Established Dimensions: Where laboratory casework is indicated to fit to other construction, establish dimensions for areas where casework is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.
- C. Field Measurements: Where laboratory casework is indicated to fit to existing construction, verify dimensions of existing construction by field measurements before fabrication and indicate measurements on Shop Drawings. Provide fillers and scribes to allow for trimming and fitting.
- D. Locate concealed framing, blocking, and reinforcements that support casework by field measurements before enclosing them, and indicate measurements on Shop Drawings.

## PART 2 - PRODUCTS

### 2.1 SOURCE LIMITATIONS

- A. Obtain laboratory casework from single source from single manufacturer unless otherwise indicated.
- B. Product Designations: Drawings indicate sizes and configurations of laboratory casework by referencing designated manufacturer's catalog numbers. Other manufacturers' laboratory casework of similar sizes and similar door and drawer configurations and complying with Specifications may be considered. See Section 016000 "Product Requirements."

### 2.2 PERFORMANCE REQUIREMENTS

- A. System Structural Performance: Laboratory casework and support framing system are to withstand the effects of the following gravity loads and stresses without permanent deformation, excessive deflection, or binding of drawers and doors:
  - 1. Suspended Base Cabinets (Internal Load): 500 lb/ft..



2. Work Surfaces (Including Tops of Suspended Base Cabinets): 200 lb/ft..
3. Wall Cabinets (Upper Cabinets): 200 lb/ft..
4. Shelves: 40 lb/sq. ft..

## 2.3 CASEWORK, GENERAL

- A. Casework Product Standard: Comply with SEFA 8 M, "Laboratory Grade Metal Casework."
- B. Flammable Liquid Storage: Where cabinets are indicated for solvent or flammable liquid storage, provide units that are listed and labeled as complying with requirements in NFPA 30 by a testing and inspecting agency acceptable to authorities having jurisdiction.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

## 2.4 METAL LABORATORY CASEWORK

- A. Steel Sheet: Cold-rolled, commercial steel (CS) sheet, complying with ASTM A1008/A1008M; matte finish; suitable for exposed applications.
- B. Basis-of-Design Product: Subject to compliance with requirements, provide Lab Design by Fenco Labs or comparable product by one of the following:
  1. Kewaunee Scientific Corporation
  2. Mott Manufacturing Ltd
- C. Nominal Metal Thickness:
  1. Sides, Ends, Fixed Backs, Bottoms, Tops, Soffits, and Items Not Otherwise Indicated: 0.048 inch. Except for flammable liquid storage cabinets, bottoms may be 0.036 inch if reinforced.
  2. Back Panels, Doors, Drawer Fronts and Bodies, and Shelves: 0.036 inch except 0.048 inch for back panels and doors of flammable liquid storage cabinets and for unreinforced shelves more than 36 inches long.
  3. Intermediate Horizontal Rails, Table Aprons and Cross Rails, Center Posts, and Top Gussets: 0.060 inch.
  4. Drawer Runners, Sink Supports, and Hinge Reinforcements: 0.075 inch.
  5. Leveling and Corner Gussets: 0.105 inch.

## 2.5 AUXILIARY CABINETS

- A. Acid Storage-Cabinet Lining: 1/4-inch- thick, phenolic-resin lining material.

- B. Tempered Glass for Glazed Doors: Clear tempered glass complying with ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality-Q3; not less than 5.0 mm thick.

## 2.6 CABINET HARDWARE

- A. General: Provide laboratory casework manufacturer's standard, commercial-quality, heavy-duty hardware complying with requirements indicated for each type.
- B. Hinges: Stainless steel, five-knuckle hinges complying with BHMA A156.9, Grade 1, with antifriction bearings and rounded tips. Provide two for doors 48 inches high or less and three for doors more than 48 inches high.
- C. Recessed Pulls: Aluminum. Provide two pulls for drawers more than 24 inches wide.
- D. Door Catches: Nylon-roller spring catches. Provide two catches on doors more than 48 inches high.
- E. Drawer Slides: ANSI/BHMA A156.9.
  - 1. Manufacturer's standard.
  - 2. Heavy Duty (Grade 1HD-100): Undermount.
    - a. Type: Full extension.
    - b. Material: Zinc-plated ball bearing slides.
    - c. Motion Feature: Self-closing mechanism.
  - 3. General-purpose drawers; provide 100 lb load capacity.
  - 4. File drawers; provide 150 lb load capacity.

## 2.7 COUNTERTOPS

- A. General: Provide laboratory tabletops and countertops with integral sink as indicated on Drawings.
- B. Epoxy Resin: Factory-molded, modified epoxy-resin formulation with smooth, nonspecular finish.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Durcon; a Wilsonart Company; Solid Epoxy Resin or comparable product by one of the following:
    - a. American Epoxy Scientific LLC
    - b. Prime Industries, Inc
  - 2. Physical Properties:
    - a. Flexural Strength: Not less than 10,000 psi.

- b. Modulus of Elasticity: Not less than 2,000,000 psi.
    - c. Hardness (Rockwell M): Not less than 100.
    - d. Water Absorption (24 Hours): Not more than 0.01 percent.
    - e. Heat Distortion Point: Not less than 380 deg F.
  - 3. Chemical Resistance: Minimum acceptable chemical-resistance performance is to result in no more than four Level 3 conditions when tested with indicated reagents in accordance with SEFA 3.
  - 4. Color: Gray.
- C. Phenolic Resin: Factory-molded, solid, wood-based fiber with thermostatic phenolic resin pressed under high heat and pressure to formulate a chemical and heat resistant finish; low sheen matte finish.
- 1. Basis-of-Design Product: Subject to compliance with requirements, provide Trespa; Top Lab Plus; Solid Phenolic Resin or comparable product by one of the following:
    - a. Fundermax
    - b. Volkern
  - 2. Physical Properties:
    - a. Flexural Strength: Not less than 10,000 psi.
    - b. Modulus of Elasticity: Not less than 1,500,000 psi.
    - c. Hardness (Rockwell M): Not less than 100.
    - d. Water Absorption (24 Hours): Not more than 0.01 percent.
    - e. Heat Distortion Point: Not less than 380 deg F.
  - 3. Chemical Resistance: Minimum acceptable chemical-resistance performance is to result in no more than four Level 3 conditions when tested with indicated reagents in accordance with SEFA 3.
  - 4. Color: Gray.

## 2.8 METAL CABINET FABRICATION

- A. General: Assemble and finish units at point of manufacture. Use precision dies for interchangeability of like-size drawers, doors, and similar parts. Perform assembly on precision jigs to provide units that are square. Reinforce units with angles, gussets, and channels. Except where otherwise specified, integrally frame and weld cabinet bodies to form dirt- and vermin-resistant enclosures. Where applicable, reinforce base cabinets for sink support. Maintain uniform clearance around door and drawer fronts of 1/16 to 3/32 inch.
- B. Flush Doors: Outer and inner pans that nest into box formation, with full-height channel reinforcements at center of door. Fill doors with noncombustible, sound-deadening material.

- C. Glazed Doors: Hollow-metal stiles and rails of similar construction as flush doors, with glass held in resilient channels or gasket material.
- D. Hinged Doors: Mortise for hinges and reinforce with angles welded inside inner pans at hinge edge.
- E. Drawers: Fronts made from outer and inner pans that nest into box formation, without raw metal edges at top. Sides, back, and bottom fabricated in one piece with rolled or formed top of sides for stiffening and comfortable grasp for drawer removal. Provide drawers with rubber bumpers, polymer roller slides, and positive stops to prevent metal-to-metal contact or accidental removal.
- F. Adjustable Shelves: Front, back, and ends formed down, with edges returned horizontally at front and back to form reinforcing channels.
- G. Toe Space: Fully enclosed, 4 inches high by 3 inches deep, with no open gaps or pockets.
- H. Tables: Welded tubing legs, not less than 2 inches square with channel stretchers as needed to comply with product standard. Weld or bolt stretchers to legs and cross-stretchers, and bolt legs to table aprons. Provide leveling device welded to bottom of each leg.
  - 1. Leg Shoes: Satin-finished, stainless steel, open-bottom, slip-on type.
- I. Utilities: Provide space, cutouts, and holes for pipes, conduits, and fittings in cabinet bodies to accommodate utility services and their support-strut assemblies.
  - 1. Provide base cabinets with removable backs for access to utility space.
- J. Utility-Space Framing: Steel framing units consisting of two steel slotted channels complying with MFMA-4, not less than 1-5/8 inches square by 0.105-inch nominal thickness, that are connected at top and bottom by U-shaped brackets made from 1-1/4-by-1/4-inch steel flat bars. Framing units may be made by welding channel material into rectangular frames instead of using U-shaped brackets.
- K. Filler and Closure Panels: Provide where indicated and as needed to close spaces between casework and walls, ceilings, and equipment. Fabricate from same material and with same finish as casework and with hemmed or flanged edges unless otherwise indicated.
  - 1. Provide knee-space panels (modesty panels) at spaces between base cabinets, where cabinets are not installed against a wall or where space is not otherwise closed. Fabricate from back-to-back panels or of hollow construction to eliminate exposed hemmed or flanged edges.
  - 2. Provide utility-space closure panels at spaces between base cabinets where utility space would otherwise be exposed, including spaces below countertops.
  - 3. Provide closure panels at ends of utility spaces where utility space would otherwise be exposed.

## 2.9 METAL CABINET FINISH

- A. General: Prepare, treat, and finish welded assemblies after assembling. Prepare, treat, and finish components that are to be assembled with mechanical fasteners before assembling. Prepare, treat, and finish concealed surfaces same as exposed surfaces.
- B. Preparation: After assembly, clean surfaces of mill scale, rust, oil, and other contaminants. After cleaning, apply a conversion coating suited to organic coating to be applied over it.
- C. Chemical-Resistant Finish: Immediately after cleaning and pretreating, apply laboratory casework manufacturer's standard two-coat, chemical-resistant, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.
  - 1. Chemical and Physical Resistance of Finish System: Finish complies with acceptance levels of cabinet surface finish tests in SEFA 8 M. Acceptance level for chemical spot test is to be no more than for Level 3 conditions.
  - 2. Colors for Metal Laboratory Casework Finish: As selected by Architect from manufacturer's full range.

## 2.10 COUNTERTOP FABRICATION

- A. Countertops, General: Provide units with smooth surfaces in uniform plane, free of defects. Make exposed edges and corners straight and uniformly beveled. Provide front and end overhang of 2 inch.
- B. Sinks, General: Provide sizes indicated or laboratory casework manufacturer's closest standard size of equal or greater volume, as approved by Architect.
  - 1. Outlets: Provide with strainers and tailpieces, NPS 1-1/2, unless otherwise indicated.
  - 2. Overflows: For each sink except cup sinks, provide overflow of standard beehive or open-top design with separate strainer. Height 2 inches less than sink depth. Provide in same material as strainer.
- C. Epoxy Resin:
  - 1. Countertops: Fabricate with factory cutouts for sinks, holes for service fittings and accessories, and butt joints assembled with epoxy adhesive and concealed metal splines.
    - a. Flat Configuration: 1-1/4 inch thick with continuous drip groove on underside 1/2 inch from overhang edge.
      - 1) Edges and Corners: Beveled.
      - 2) Backsplash: Applied.

- b. Construction: Uniform throughout full thickness.
  - 2. Tabletops:
    - a. Flat Configuration: 1-1/4 inch thick with continuous drip groove on underside at perimeter.
      - 1) Edges and Corners: Beveled.
    - b. Tabletop Construction: Uniform throughout full thickness.
  - 3. Sinks (undermount): Molded in one piece with smooth surfaces, coved corners, and bottom sloped to outlet; 1/2-inch minimum thickness.
    - a. Provide with polypropylene strainers and tailpieces.
    - b. Provide integral sinks in epoxy countertops, bonded to countertops with invisible joint line.
    - c. Provide sinks for drop-in installation in phenolic-composite countertops with 1/4-inch- thick lip around perimeter of sink.
    - d. Provide sinks for underside installation with manufacturer's recommended adjustable support system for table- and cabinet-type installations.
  - 4. Cup Sinks: Provide in material indicated, 3-by-9-inch oval.
    - a. Epoxy Cup Sinks: Provide with polypropylene strainers and integral tailpieces.
  - 5. Troughs: Provide in material indicated and pitch to drains not less than 1/8 inch/foot. Except where troughs empty into sinks, provide NPS 1-1/2 outlets with strainers and tailpieces.
  - 6. Epoxy Troughs: Molded in one piece with smooth surfaces and coved corners; 1/2-inch minimum thickness. Provide polypropylene strainers and tailpieces.
- D. Phenolic Resin:
- 1. Countertops: Fabricate with factory cutouts for accessories, and butt joints assembled with epoxy adhesive and concealed metal splines.
    - a. Flat Configuration: 1-1/4 inch thick.
      - 1) Edges and Corners: Beveled.
      - 2) Backsplash: Applied.
    - b. Construction: Uniform throughout full thickness.
  - 2. Tabletops:
    - a. Flat Configuration: 1-1/4 inch thick.
    - b. Edges and Corners: Beveled.

- c. Tabletop Construction: Uniform throughout full thickness.

## 2.11 LABORATORY ACCESSORIES

- A. Reagent Shelves: Provide as indicated, fabricated from same material as adjacent countertop unless otherwise indicated.
- B. Resin Pegboards: Polypropylene, epoxy, or phenolic-composite pegboards with removable polypropylene pegs and stainless steel drip troughs with drain outlet.

## 2.12 WATER AND LABORATORY GAS SERVICE FITTINGS

- 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. Broen A/S
  - 2. Chicago Faucets; Geberit Group
  - 3. WaterSaver Faucet Co
- B. Service Fittings: Provide units that comply with SEFA 7, "Recommended Practices for Fixtures." Provide fittings complete with washers, locknuts, nipples, and other installation accessories. Include wall and deck flanges, escutcheons, handle extension rods, and similar items.
  - 1. Provide units that comply with "Vandal-Resistant Fittings" recommendations in SEFA 7.
- C. Materials: Fabricated from cast or forged red brass unless otherwise indicated.
  - 1. Reagent-Grade Water Service Fittings: Polypropylene, PVC, or PVDF for parts in contact with water.
- D. Finish: Chromium plated.
- E. Water Valves and Faucets: Provide units complying with ASME A112.18.1, with renewable seats, designed for working pressure up to 80 psig.
  - 1. Vacuum Breakers: Provide ASSE 1035 vacuum breakers on water fittings with serrated outlets.
  - 2. Aerators: Provide aerators on water fittings that do not have serrated outlets.
  - 3. Self-Closing Valves: Provide self-closing valves where indicated.
- F. Ball Valves: Chrome-plated ball and PTFE seals. Handle requires no more than 5 lbf to operate. Provide units designed for working pressure up to 75 psig, with serrated outlets.

1. Locking Safety Handles: Where ball valves are indicated for fuel-gas use, provide handles that must be pulled up before being turned on.
- G. Ground-Key Cocks: Tapered core and handle of one-piece forged brass, ground and lapped, and held in place under constant spring pressure. Provide units designed for working pressure up to 40 psig, with serrated outlets.
- H. Needle Valves: Provide units with renewable, self-centering, floating cones and renewable seats of stainless steel or Monel metal, with removable serrated outlets.
  1. Provide units designed for working pressure up to 100 psig.
- I. Remote-Control Valves: Provide needle valves, straight-through or angle type as indicated for fume hoods and where indicated.
- J. Handles: Provide three- or four-wing, molded-plastic or powder-coated-metal handles for valves unless otherwise indicated.
  1. Provide lever-type handles for ground-key cocks. Lever handle aligns with outlet when valve is closed and is perpendicular to outlet when valve is fully open.
  2. Provide lever-type handles for ball valves unless otherwise indicated. Lever handle aligns with outlet when valve is closed and is perpendicular to outlet when valve is fully open.
  3. Provide heat-resistant plastic handles for steam valves.
  4. Provide knurled, molded-plastic handles for needle valves.
- K. Service-Outlet Identification: Provide color-coded plastic discs with embossed identification, secured to each service-fitting handle to be tamper resistant. Comply with SEFA 7 for colors and embossed identification.

## 2.13 ELECTRICAL AND COMMUNICATION SERVICE FITTINGS

- A. Service Fittings, General: Provide units complete with metal housings, receptacles, switches, pilot lights, data communication outlets, cover plates, accessories, and gaskets required for mounting on laboratory casework.
- B. Receptacles:
  1. Duplex GFCI Convenience Receptacles: 125 V, 20 A; NEMA WD 6, Configuration 5-20R; feed-through type with integral LED indicator light.
    - a. Standards: Comply with NEMA WD 1, UL 498, UL 943 Class A, and FS W-C-596.
  2. Color of Receptacles: As selected by Architect unless otherwise indicated or required by NFPA 70.



C. Switches:

1. Single-Pole Switches: 120/277 V, 20 A.
  - a. Standards: Comply with NEMA WD 1, UL 20, and FS W-S-896.
2. Two-Pole Switches: 120/277 V, 20 A.
  - a. Comply with NEMA WD 1, UL 20, and FS W-S-896.
3. Pilot-Light Switches, Single Pole: 120/277 V, 20 A, with LED-lighted handle, illuminated when switch is off.
  - a. Standards: Comply with NEMA WD 1, UL 20, and FS W-S-896.
4. Key-Operated Switches: 120/277 V, 20 A; single pole, with factory-supplied key in lieu of switch handle.
  - a. Standards: Comply with NEMA WD 1, UL 20, and FS W-S-896.
5. Color of Switches: As selected by Architect unless otherwise indicated or required by NFPA 70.

D. Data Communication Outlets: Two RJ-45 jacks for terminating 100-ohm, balanced, four-pair twisted-pair cabling complying with TIA-568-C.1; complying with Category 6. Comply with UL 1863.

E. Cover Plates: Provide satin-finish, chrome-plated cover plates with formed, beveled edges.

F. Cover-Plate Identification: Use 1/4-inch- high letters unless otherwise indicated. For stainless steel or chrome-plated metal, stamp or etch plate and fill in letters with black enamel.

1. Provide at every cover plate.
  - a. Receptacles other than standard 125-V duplex, grounding type.
  - b. Switches and thermal-overload switches.
  - c. Pilot lights when located remotely from associated equipment or switch, where function is not obvious.
  - d. Receptacles, switches, and other locations indicated.
2. Provide the following information:
  - a. Voltage and phase for receptacles other than standard 125-V duplex, grounding type.
  - b. Indicate equipment being controlled by switches and thermal-overload switches.

- c. Indicate equipment being controlled for pilot lights when located remotely from associated equipment or switch, where function is not obvious.
  - d. Number of the breaker in panelboard that controls device.
- G. Pedestal-Type Fittings: Cast-aluminum housings with sloped single face or two faces, as indicated, with neoprene gasket under base and with concealed mounting holes in base for attaching to laboratory casework. Provide holes tapped for conduits.
- H. Line-Type Fittings: Provide with cast-metal boxes with threaded holes for mounting on rigid steel conduit. Provide cover plates same size as boxes.
- I. Recessed-Type Fittings: Provide with galvanized-steel boxes.
- J. Finishes for Service-Fitting Components: Provide housings or boxes for pedestal- and line-type fittings with manufacturer's standard baked-on, chemical-resistant enamel in color as selected by Architect from manufacturer's full range.

#### 2.14 GAS CYLINDER RACKS

- 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. Basis of Design: Durham Manufacturing
  - 2. ULine
  - 3. Justrite
  - 4. Grainger
- B. Four Cylinder Gas Rack (Basis of Design Model No. GCRV-302430-08T)
  - 1. Provide steel tube 3 gauge rack that secures to floor with included concrete anchors, and includes chains.
  - 2. Built to meet and exceed quality and safety standards of OSHA, OSHPD, UFC, NFPA and CGA.
  - 3. Black, textured, powder coat finish, good for outdoor or indoor use. Resistant to chemicals and rust.
- C. Two Cylinder Gas Rack (Basis of Design Model No. GCRV-162430-08T)
  - 1. Provide steel tube 3 gauge rack that secures to floor with included concrete anchors, and includes chains.
  - 2. Built to meet and exceed quality and safety standards of OSHA, OSHPD, UFC, NFPA and CGA.
  - 3. Black, textured, powder coat finish, good for outdoor or indoor use. Resistant to chemicals and rust.

## 2.15 LABORATORY URETHANE CHAIRS

- 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. Basis of Design: BIOFIT ToughTech (UU) Series, Model No. UUA-M-HG
  - 2. Bevco, Everlast Series.
  - 3. Fisherbrand
  - 4. LapRepCo.
- B. Provide soft-touch pneumatic chair with urethane seats, backrest with ventilated ribs, and integral lumbar support.
  - 1. Constructed with a tubular steel base and affixed footring.
  - 2. 2" high polyamide glides.
  - 3. Adjustable bench seat height; 18"-25".
  - 4. Standard Black powder coat finish.
  - 5. Thirteen year warranty.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of reinforcements, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION OF CABINETS

- A. Comply with installation requirements in SEFA 2. Install level, plumb, and true in line; shim as required using concealed shims. Where laboratory casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical. Do not exceed the following tolerances:
  - 1. Variation of Tops of Base Cabinets from Level: 1/16 inch in 10 feet.
  - 2. Variation of Bottoms of Upper Cabinets from Level: 1/8 inch in 10 feet.
  - 3. Variation of Faces of Casework from a True Plane: 1/8 inch in 10 feet.
  - 4. Variation of Adjacent Surfaces from a True Plane (Lippage): 1/32 inch.
  - 5. Variation in Alignment of Adjacent Door and Drawer Edges: 1/16 inch.
- B. Utility-Space Framing: Secure to floor with two fasteners at each frame. Fasten to partition framing, wood blocking, or metal reinforcements in partitions and to base cabinets.

- C. Base Cabinets: Fasten cabinets to utility-space framing, partition framing, wood blocking, or reinforcements in partitions, with fasteners spaced not more than 16 inches o.c. Bolt adjacent cabinets together with joints flush, tight, and uniform.
  - 1. Where base cabinets are installed away from walls, fasten to floor at toe space at not more than 24 inches o.c. and at sides of cabinets with not less than two fasteners per side.
- D. Wall Cabinets: Fasten to hanging strips, masonry, partition framing, blocking, or reinforcements in partitions. Fasten each cabinet through back, near top, at not less than 16 inches o.c.
- E. Install hardware uniformly and precisely.
- F. Adjust operating hardware so doors and drawers align and operate smoothly without warp or bind and contact points meet accurately. Lubricate operating hardware as recommended by manufacturer.

### 3.3 INSTALLATION OF COUNTERTOPS

- A. Comply with installation requirements in SEFA 2. Abut top and edge surfaces true in plane with flush hairline joints and with internal supports placed to prevent deflection. Locate joints where indicated on Shop Drawings.
- B. Field Jointing: Where possible, make in same manner as shop-made joints, using dowels, splines, fasteners, adhesives, and sealants recommended by manufacturer. Shop prepare edges for field-made joints.
  - 1. Plastic-Laminate Countertops: Secure field-made joints using concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten in accordance with manufacturer's written instructions to exert a uniform heavy pressure at joints.
- C. Fastening:
  - 1. Secure countertops, except for epoxy countertops, to cabinets with Z-type fasteners or equivalent, using two or more fasteners at each cabinet front, end, and back.
  - 2. Secure epoxy countertops to cabinets with epoxy cement, applied at each corner and along perimeter edges at not more than 48 inches o.c.
  - 3. Where necessary to penetrate countertops with fasteners, countersink heads approximately 1/8 inch and plug hole flush with material equal to countertop in chemical resistance, hardness, and appearance.
- D. Provide holes and cutouts required for service fittings.

- E. Provide scribe moldings for closures at junctures of countertop, curb, and splash with walls as recommended by manufacturer for materials involved. Match materials and finish to adjacent laboratory casework. Use chemical-resistant, permanently elastic sealing compound where recommended by manufacturer.
- F. Dress joints smooth, remove surface scratches, and clean entire surface.

### 3.4 INSTALLATION OF LABORATORY ACCESSORIES

- A. Install accessories in accordance with Shop Drawings, installation requirements in SEFA 2, and manufacturer's written instructions.
- B. Securely fasten adjustable shelving supports, stainless steel shelves, and pegboards to partition framing, wood blocking, or reinforcements in partitions.
- C. Install shelf standards plumb and at heights to align shelf brackets for level shelves. Install shelving level and straight, closely fitted to other work where indicated.
- D. Securely fasten pegboards to partition framing, wood blocking, or reinforcements in partitions.

### 3.5 INSTALLATION OF SERVICE FITTINGS

- A. Comply with requirements in other Sections for installing water and laboratory gas service fittings and electrical devices.
- B. Install fittings in accordance with Shop Drawings, installation requirements in SEFA 2, and manufacturer's written instructions. Set bases and flanges of sink- and countertop-mounted fittings in sealant recommended by manufacturer of sink or countertop material. Securely anchor fittings to laboratory casework unless otherwise indicated.

### 3.6 CLEANING AND PROTECTING

- A. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.
- B. Protect countertop surfaces during construction with 6-mil plastic or other suitable water-resistant covering. Tape to underside of countertop at a minimum of 48 inches o.c.

### 3.7 SERVICE-FITTING SCHEDULE

- A. Water Service Fitting: Type WF-1.
  - 1. Fitting Type: Rigid, gooseneck, single-service faucet.
  - 2. Outlet: Vacuum breaker and removable serrated outlet.

3. Mounting: Deck mounted.
4. Additional Requirements: Self-closing valves.

B. Laboratory Gas Service Fitting: Type GF-1.

1. Service: Air, Vacuum, Nitrogen
2. Fitting Type: Turret, Line mounted, and Flange type.
3. Outlets: One..
4. Outlet Type: Straight.
5. Valve Type: Ball valve.

C. Electrical Service Fitting: Type EF-1.

1. Fitting Type: Recessed Line mounted.
2. Device: Three duplex receptacles.
3. Additional Requirements: GFCI receptacles.

D. Communication Service Fitting: Type CF-1.

1. Fitting Type: Recessed Line mounted.
2. Device: Two duplex receptacles.

END OF SECTION 123553.13

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section includes prefabricated insulated cold storage rooms with wall, floor, and ceiling panels; door, frame, and hardware; a self-contained refrigeration unit; controls and lighting; and shelving and supports.

### 1.2 RELATED SECTIONS

- A. Division 22 – Plumbing
- B. Division 23 – Mechanical
- C. Division 26 – Electrical

### 1.3 REFERENCES

- A. ASTM International:
  - 1. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - 2. ASTM A666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
  - 3. ASTM A792 - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
  - 4. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
  - 5. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 6. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
  - 7. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation.
- B. National Electrical Manufacturers Association:
  - 1. NEMA MG 1 - Motors and Generators.
- C. NSF International:
  - 1. NSF 7 - Food Service Refrigerators and Storage Freezers.
- D. Underwriters Laboratories Inc.:
  - 1. UL - Electrical Appliance and Utilization Equipment Directory.

#### 1.4 COORDINATION

- A. Coordinate cold storage equipment layout and installation with other work, including layout and installation of lighting fixtures, HVAC equipment, and fire-suppression system components.
- B. Coordinate locations and requirements of utility service connections.
- C. Coordinate sizes, locations, and requirements of the following:
  - 1. Overhead equipment supports.
  - 2. Insulated floors.

#### 1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site .

#### 1.6 ACTION SUBMITTALS

- A. Product Data
  - 1. Fabricated equipment.
  - 2. Walk-in cold storage equipment.
  - 3. Utility distribution systems.
    - a. Submit data on hardware and fixtures, joint details. Refrigeration system, performance requirements, electrical and piped service connection capacities.
- B. Include the following:
  - 1. Manufacturer's model number.
  - 2. Accessories and components that will be included for the Project.
  - 3. Clearance requirements for access and maintenance.
  - 4. Utility service connections for water, drainage, power, and fuel; include roughing-in dimensions.
- C. Shop Drawings: For fabricated equipment. Include plans, elevations, sections, roughing-in dimensions, fabrication details, utility service requirements, and attachments to other work.
- D. Samples for Initial Selection: For units with factory-applied color finishes.
- E. Samples for Verification: For each factory-applied color finish required, in manufacturer's standard sizes.



## 1.7 INFORMATIONAL SUBMITTALS

### A. Coordination Drawings:

1. Indicate locations of cold storage equipment and connections to utilities.
2. Key equipment using the same designations as indicated on Drawings.
3. Include plans and elevations; clearance requirements for equipment access and maintenance; details of equipment supports; and utility service characteristics.

### B. Sample Warranty: For special warranty.

## 1.8 CLOSEOUT SUBMITTALS

### A. Operation and Maintenance Data: For cold storage equipment to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
  - a. Product Schedule: For each cold storage equipment item, include the following:
    - 1) Designation indicated on Drawings.
    - 2) Manufacturer's name and model number.
    - 3) List of factory-authorized service agencies including addresses and telephone numbers.

## 1.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Design cold room roof under direct supervision of Professional Engineer experienced in design of this Work and licensed in the State of New York.

## 1.10 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of construction contiguous with foodservice equipment by field measurements before fabrication. Indicate measurements on Coordination Drawings.

## 1.11 WARRANTY

- A. Refrigeration Compressor Warranty: Manufacturer agrees to repair or replace compressors that fail in materials or workmanship within specified warranty period.
  1. Failure includes, but is not limited to, inability to maintain set temperature.

- a. Warranty Period: Five years from date of Substantial Completion.
2. Fifteen year panel warranty.
3. Eighteen months parts and labor warranty

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. NSF Standards: Provide equipment that bears NSF Certification Mark or UL Classification Mark certifying compliance with applicable NSF standards.
- B. UL Certification: Provide electric and fuel-burning equipment and components that are evaluated by UL for fire, electric shock, and casualty hazards according to applicable safety standards, and that are UL certified for compliance and labeled for intended use.
- C. Regulatory Requirements: Install equipment to comply with the following:
  1. ASHRAE 15, "Safety Code for Mechanical Refrigeration."
  2. NFPA 54, "National Fuel Gas Code."
  3. NFPA 70, "National Electrical Code."

### 2.2 WALK-IN COLD STORAGE EQUIPMENT

- A. Walk-in Refrigeration Units:
  1. Basis-of-Design Product: Subject to compliance with requirements, provide Nor-Lake ENVIROLINE 4.0 INDOOR Walk-In Cooler (preliminary quote attached) or comparable product by one of the following:
    - a. Bally Refrigerated Boxes, Inc.
    - b. BioCold Environmental
  2. Description: Cooler.
    - a. Wall and Ceiling Panels: Interlocking insulating panels.
    - b. Floors: Insulated floor panels.
    - c. Doors:
      - 1) Hinges: Self-closing and spring loaded; three per door.
      - 2) Latch: Deadbolt locking handle with independent key/padlock feature.
      - 3) Include safety-release handle that opens door from inside when door is locked.
    - d. Door Accessories:
      - 1) Vision port.
      - 2) Pressure relief port.

- 3) Threshold: Stainless steel, factory installed.
    - 4) Anticondensate heater at freezer doors.
  - e. Vaporproof Lighting Fixtures: LED .
    - 1) Control: Pilot light and toggle switch located on exterior of door panel.
    - 2) Quantity: One per compartment, located on door panel .
  - f. Refrigeration System: Self-contained, mounted on unit .
    - 1) Operating Temperature: 4 degrees celsius .
  - g. Temperature Monitoring System: Electronic monitoring and remote audible alarm system that warns when temperatures register 1 deg C or below set temperature .
  - h. Closure Panels and Trim: Include closure panels and trim .
  - i. Electrical Service: Equip unit for connection to service indicated on Drawings.
3. Finishes:
- a. Exposed Exterior Finish: Embossed white steel .
  - b. Interior Finish: Embossed white steel .
  - c. Closure Panels and Trim: Matched to exposed exterior finish of panels .
4. Accessories: Provide optional accessories as indicated on the attached Basis of Design preliminary quote.

## 2.3 MISCELLANEOUS MATERIALS

- A. Installation Accessories, General: NSF certified for end-use application indicated.
- B. Elastomeric Joint Sealant: ASTM C920; silicone. Type S (single component), Grade NS (nonsag), Class 25, Use NT (nontraffic) related to exposure, and Use M, G, A, or O as applicable to joint substrates indicated.
  - 1. Public Health and Safety Requirements:
    - a. Sealant is certified for compliance with NSF standards for end-use application indicated.
  - 2. Cylindrical Sealant Backing: ASTM C1330, Type C, closed-cell polyethylene, in diameter greater than joint width.

## 2.4 FINISHES

- A. Powder-Coat Finishes: Immediately after cleaning and pretreating, electrostatically apply manufacturer's standard, baked-polymer, thermosetting powder finish. Comply with resin manufacturer's written instructions for application, baking, and minimum dry film thickness.

## PART 3 - EXECUTION

### 3.1 DELIVERY, STORAGE, AND HANDLING

- A. Wrap and crate finished components and assemblies at factory to prevent damage or marring of surfaces during shipping and handling.
- B. Do not deliver materials or assemblies to site until installation spaces are ready to receive units.

### 3.2 INSTALLATION

- A. Install cold storage equipment level and plumb, according to manufacturer's written instructions.
  - 1. Connect equipment to utilities.
  - 2. Provide cutouts in equipment, neatly formed, where required to run service lines through equipment to make final connections.
- B. Complete equipment assembly where field assembly is required.
  - 1. Provide closed butt and contact joints that do not require a filler.
- C. Install equipment with access and maintenance clearances that comply with manufacturer's written installation instructions and with requirements of authorities having jurisdiction.
- D. Install cabinets and similar equipment on bases in a bed of sealant.
- E. Install closure-trim strips and similar items requiring fasteners in a bed of sealant.
- F. Install joint sealant in joints between equipment and abutting surfaces with continuous joint backing unless otherwise indicated. Produce airtight, watertight, vermin-proof, sanitary joints.
- G. Locate condensing unit for room on top of ceiling above door. Support evaporator coil on room interior and make connections as required for utilities and services. Wire-in alarm unit and door and threshold heaters. Connect units to valved water piping. Run condensate line to the nearest drain.

- H. Install ceiling trim and ceiling fascia, cover plates between top of room and finished ceiling and end closure plates between the room and the adjacent wall.

### 3.3 FIELD QUALITY CONTROL

- A. Test and adjust control equipment to meet specified performance requirements.
- B. Operate room and test full range of functions over continuous 48 hour period, recording physical data on operating equipment. Continuously record temperature and humidity.
- C. Test each room for air tightness.
- D. Adjust and re-test room not meeting specified requirements.
- E. Submit three copies of written quality control test report.
- F. Shut off equipment and controls and lock doors to prevent operation or access by unauthorized persons.

### 3.4 CLEANING AND PROTECTING

- A. After completing installation of equipment, repair damaged finishes.
- B. Clean and adjust equipment as required to produce ready-for-use condition.
  - 1. Wash and clean floor, walls, and ceiling inside room and exposed surfaces on outside. Clean glass, fixtures and fittings.
- C. Protect equipment from damage during remainder of the construction period.
  - 1. Remove temporary protection from prefinished surfaces.

### 3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain cold storage equipment.

### 3.6 MAINTENANCE SERVICE

- A. Supply service and maintenance of refrigeration unit for two years from Date of Substantial Completion.

END OF SECTION 114000

To	Phone	PROPOSAL		
Kideney Architects  143 Genesee Street Buffalo, NY 14203				
	Fax	Terms	Date	Quote No.
		NO TERMS - Credit	4/3/2025	Q016615
	Email	Needed	Sales Representative	
Proposal Valid for	Ship Date	F.O.B.	Rep Email	
60 Days		Fact PPD		

#### SALES TAX NOTICE

Unless your tax exemption certificate is on file with us all applicable state sales tax charges will be applied at the time of invoicing.

Qty	Item No.	Description	Unit Price	Extension
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Please note your company has not yet established payment terms. To avoid a delay in order processing, a credit application is required please reach out to us for further information.

**NOTE: THIS BID, IF ACCEPTED, IS SUBJECT TO EXECUTION OF A WRITTEN CONTRACT OR PURCHASE ORDER**

1	MISC-46	<p>Nor-Lake ENVIROLINE 4.0 INDOOR Walk-In Cooler 8' 11" long, 5' 10" wide, 10' 7" high. Finishes: 26 Gauge Embossed White Steel - Interior wall, Exterior wall, Interior ceiling 26 Gauge Smooth Galvanized - Ceiling topside, Floor bottomside .100 Smooth Aluminum - Interior floor (1) Model CP8L Series Control Panel, U.L. Approved. CP8L Microprocessor Based Programmable Temperature Controller, Color Touch Screen Display, Humidity Display, Simultaneous Product and Air Temp. Display, System Mode Indicator, High/Low Audio/Visual Alarm with Dry Contacts, System Over/Under Temp Safety Shutdown, Power Failure Alarm, Service Prompts, Password Entry System and Expandable for Communication Ports and Light Control. Key Locked Door with Viewing Cover, Circuit Breakers and 10" Temperature/Humidity Chart Recorder. (42) Sq. Ft. Of White Aluminum Grid Ceiling Plenum (42) Sq. Ft. Of 1/8" Vinyl Floor Matting Black (1) 36" X 78" Walk-In Door left-hand swing Includes door closer, cam lift hinges, NL9800 deadbolt key/padlock handle with inside release, magnetic gasket, heater wire, and double sweep gasket. (1) Additional Standard Hinge (1) 36" High - Door &amp; Frame - Exterior &amp; Interior Kickplates (16 Gauge Stainless Steel) (1) Norlake 14 x 14 Unheated Viewport Cooler (1) Door Through Panel Electrical; All Conduit Concealed Inside The Door Frame, Hole Pre-Drilled Through Ceiling And Field Installed Ceiling Mounted Junction Box With Conduit Provided (INDOOR ONLY) (1) Thermostatically Controlled Door Heater Wire (Adjusted At The Control Panel ) (Scientific) (1) Scientific Door Section with Control Panel (1) Scientific Nameplates and Labels (1) 36" Interior Ramp With Non-Skid Strips Applied To Top (24" Deep) (1) 48" LED Vapor-proof All Temperature Integrated Light Fixture (Shipped Loose) (8) GFI Weatherproof 20 AMP Duplex Receptacle With Power Stubbed To Ceiling Topside. (212) Sq. Ft. Of .100 Smooth Aluminum Tapping Plate Wall Backing - Advise Location On Floor Plan (3 walls, full height, as shown on drawing) (1) WHITE CONDUIT ENCLOSURE 10'-7" ROOM (48") INCLUDES CLAMP (1) Chrome-Kote Shelving 7' 0" x 6' 2" x 1' 2" x 3 tiers. 100CFM Vent Air <b>Coordinate final CFM requirements with end user and Mechanical.</b> (1) 6" Diameter x 5' Insulated Supply Pipe For Vent And Duct Air System With Elbow, Diffuser And Ceiling Opening. (1) 6" Diameter x 5' Insulated Exhaust Pipe For Vent And Duct Air System With Elbow, Diffuser And Ceiling Opening. (1) Variable Speed Exhaust Fan F130D – 30 to 130 CFM (P/N:152808)(Set to 100 CFM)</p>	\$	\$
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will not be responsible for freight charges, rigging or any special delivery requirements such as lift gate delivery or delivery inside a customer's facility unless noted on this quotation.



To	Phone	PROPOSAL		
Kideney Architects  143 Genesee Street Buffalo, NY 14203				
	Fax	Terms	Date	Quote No.
		NO TERMS - Credit	4/3/2025	Q016615
	Email	Needed	Sales Representative	
Proposal Valid for	Ship Date	F.O.B.	Rep Email	
60 Days		Fact PPD		

#### SALES TAX NOTICE

Unless your tax exemption certificate is on file with us all applicable state sales tax charges will be applied at the time of invoicing.

Qty	Item No.	Description	Unit Price	Extension
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(1) Motorized Damper 6" Diameter  
 (1) 6" Air Regulator 100CFM On Exhaust/Supply End(118865)  
 (1) IAT-150-RE Industrial Dehumidifier Complete with PVC Process Ductwork and Process Insulation (React Ductwork by Others)  
 (1) HSMD030EB/2577273\*  
 3HP Cond Unit 208-230/60/1 R-448A/R-449A, Scroll Water-Cooled Less Timer, Medium Temp, 29933 BTUH System Capacity. Less Timer. Sized for 100 F. Temperature at Condenser. @ 220#. MCA: 39, MOP: 45, RLA: 21, LRA: 112. STAEFA proportional refrigeration valve with interface board, CPR valve, suction accumulator, hand valve installed.  
 (1) E1MD0304A-TA2\*  
 Evap 115/60/1 R-448A/R-449A, Air Defrost Mtd TXV/Temp Ctrl/Sol, Medium Temp, 30888 BTUH Evaporator Capacity. 77" (L) 16" (W) 17" (H) @ 147#.  
 Calculated load for Cooler (4.0°C, 20%RH) is 21466 BTU's/hour calculated from 90 °F ambient temperature, 900' elevation, 70 °F floor temperature, 14.09 minutes open door time per 24 hrs for(1) 36.00" X 78.00" walk-indoor opening into 90.00 °F ambient, 1 x 48" LED Vapor-proof All Temperature Integrated Light Fixture (Shipped Loose) 42 Watts operating 8 hours per day, 0 occupants working 8 hours per day, Dehumidifier (134400 Btu/24 hrs.), 100 CFM Vent Air (134350 Btu/24 hrs.). All calculations are based on data supplied by ASHRAE publications.  
 Refrigeration is "sized" for holding product only; that is; our calculation is based on product entering at the same temperature as the desired temperature of this walk-in. If you feel that this is insufficient, please advise.  
 Quotation is subject to change upon receipt of detailed specifications and/or refrigeration load information.  
 Refrigeration sizing is based on maximum line runs of 50 feet per system. Local Codes: Walk-Ins may need engineered drawings or special construction to meet local code approvals for rain, wind, seismic, and snow load approvals. If required, please contact for lead time and pricing to meet these requirements.

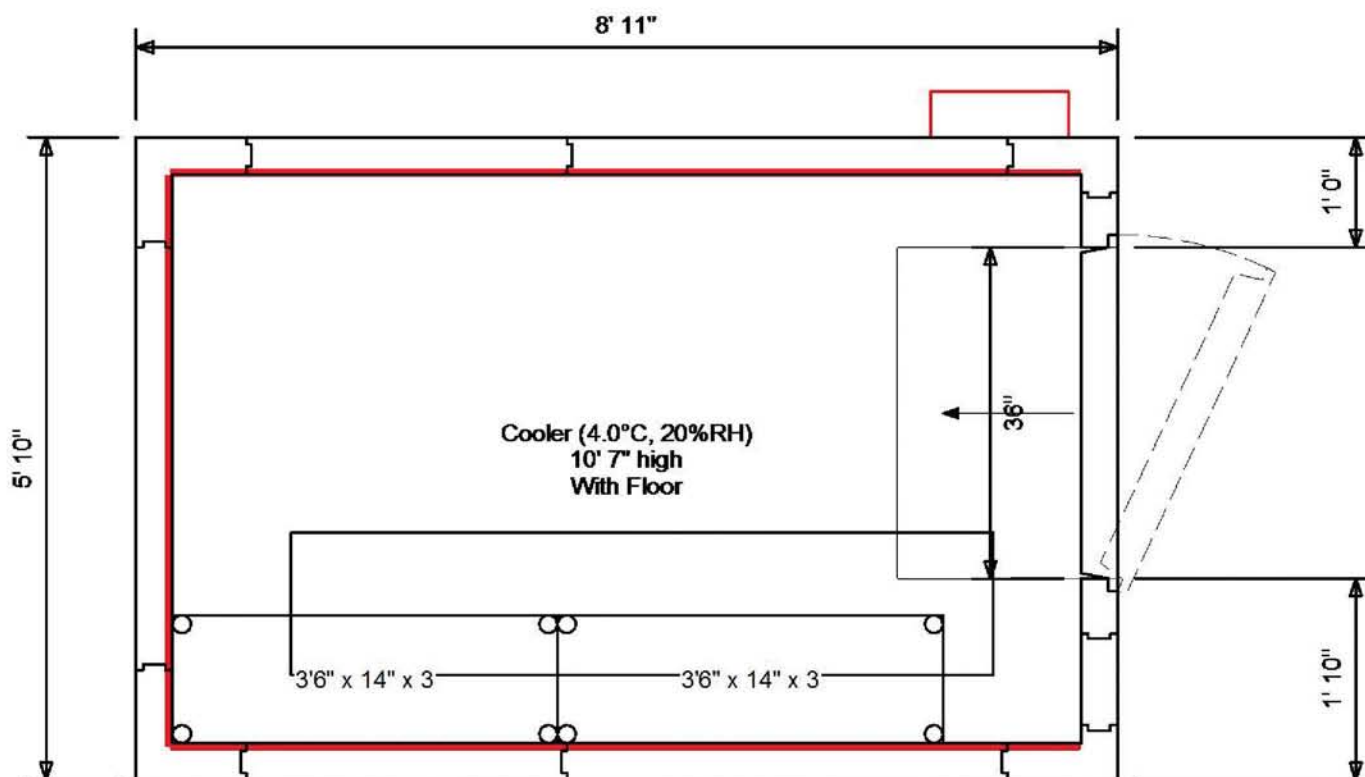
will not be responsible for freight charges, rigging or any special delivery requirements such as lift gate delivery or delivery inside a customer's facility unless noted on this quotation.

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Kideney Architects  143 Genesee Street Buffalo, NY 14203					
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Qty	Item No.	Description	Unit Price	Extension
-----	----------	-------------	------------	-----------



**NOTE: Pricing includes installation. Installation price subject to change based upon site evaluation**

Install

Installation

\$0.00

Free freight to the loading dock (Continental US)  
(End user has a raised dock and does not require any assistance with unloading the product. Additional fees would apply for any additional services such as liftgate, over threshold delivery, inside delivery, etc. Please contact us if any of these services are needed.)

Please reference our proposal number, beginning with Q, at the time of purchase.

Please forward all purchase orders to  
purchaseorders@

will not be responsible for freight charges, rigging or any special delivery requirements such as lift gate delivery or delivery inside a customer's facility unless noted on this quotation.



## Terms and Conditions

Thank you for allowing \_\_\_\_\_ to offer this proposal. Please take a few minutes to read and familiarize yourself with the following terms and order instructions:

1. Mail, fax or e-mail order to:
  
2. Proposal Valid For: 60 Days
  
3. Sales Tax Notice: Unless your sales tax exemption certificate is on file with us, all applicable state sales tax charges will be applied to your order at time of invoicing.
  
4. Unless specifically noted on this proposal, this pricing does not include and \_\_\_\_\_ not responsible for freight charges, rigging or special delivery requirements such as lift-gate or inside delivery. You will be responsible for any special services associated with delivery of equipment noted on this proposal.
  
5. The pricing provided within this proposal is for 1) transactions with pre-approved credit terms or 2) prepaid orders via ACH or check only. If paying by credit card, please contact your salesperson. \_\_\_\_\_ reserves the right to charge a 3.5% credit card fee (where permissible by law) for the pass-through credit card fees charged to \_\_\_\_\_ by merchant services processing.
  
6. Terms: NO TERMS - Credit Needed
  
7. At time of delivery, you are responsible for REFUSAL of any items that have visible damage. Should you accept damaged items, \_\_\_\_\_ will bear no responsibility for replacement or repair of those damaged items. If freight damage has occurred, refuse acceptance and immediately contact \_\_\_\_\_

## Returns & Cancellations

Please contact customer service to coordinate returns at

- a. Item(s) must be unused and in the original packaging.
- b. Item(s) must be returned within 15-30 days of receipt.
- c. Must obtain an RMA# and correct return address in order to receive a credit.
- d. Customer is responsible for original freight, return freight and a restocking fee (between 15-50%).
- e. Credits will not be issued for any item received with freight damage.
- f. Some items may not be returnable. Confirm with your sales representative prior to placing your order.

## Order Cancellations

All cancellation requests must be submitted in writing. Please contact us at

- a. Some items may not be cancelled. Confirm with your sales representative prior to placing your order.

**If product has shipped prior to cancellation request, the order will classify as a return. See the above Return Information for further details.**

## SECTION 210000 - GENERAL REQUIREMENTS FOR DIVISION 21

### PART 1 - GENERAL

#### 1.1 BID AND CONTRACT DOCUMENTS

- A. All Work in this Division is subject to the provisions of the General Conditions, Supplementary General Conditions and Requirements of Division 1 General Requirements.
- B. By submitting the bid, the Contractor acknowledges that he has not received any verbal directives from the Owner, Architects and Engineers (and their employees and sub-consultants) at any time before, during or after the bid. He further acknowledges that he has verified with all his sub-contractors, suppliers, vendors, and their representatives that they have not received any verbal directives from the Owner, Architects and Engineers (and their employees and sub-consultants) at any time before, during or after the bid. The Contractor further acknowledges that all changes to the bid documents have been only in the form of formal addendum.
- C. By starting Work on this project, the Contractor acknowledges that all directives, field orders and change order will be only from the Owner or his Designated Representative and only in writing. All other directives verbal or otherwise will be at the Contractor's own risk.

#### 1.2 SCOPE OF WORK

- A. The scope of this Work includes fire protection systems for the project as indicated on the Contract Documents, including, but not limited to the following:
  - 1. Provide upright/pendent sprinklers as indicated.
  - 2. Complete and operational sprinkler systems. Connect to existing piping where shown on Drawings.
  - 3. Hydrostatic test.
  - 4. Acceptance testing (flow test, drain down test).
  - 5. Cleaning and flushing before hydrotest.
  - 6. Identification as indicated and specified.
  - 7. All necessary cutting, patching and firestopping.
  - 8. Miscellaneous items shown and/or specified.

#### 1.3 PERMITS AND INSPECTIONS

- A. Permits: Division 21 shall acquire all required permits required for execution of the Work of this Division and shall pay all fees and charges for same.

#### 1.4 CODES AND STANDARDS

- A. Building Code of New York State: Provide all Work in compliance with and meet the requirements of the latest issue.
- B. Standards: All equipment shall meet all the requirements of ANSI, NEMA, AWWA, ASME, and ASPE Standards.
- C. Listing: All equipment and devices for which Underwriters Laboratories has a listing service, shall be UL listed and FM approved.
- D. All materials and installation shall comply with:
  - 1. Building Code of New York State.
  - 2. Fire Code of New York State.
  - 3. National Fire Protection Association (NFPA).
  - 4. Local Utilities.
  - 5. Authorities Having Jurisdiction.
  - 6. Federal and State Occupational Safety and Health Administration.
  - 7. Local Municipality/City Codes and Ordinances.

#### 1.5 LOCAL AUTHORITY HAVING JURISDICTION (AHJ)

- A. This Document does not supercede any Code, local or otherwise. All Contractors must be aware of any local requirements and Codes that may affect this project. The AHJ will make all final decisions concerning all code interpretations. Any discrepancies must be reported to the Architect or Engineer within 24 hours. Any code violations are the responsibility of the Contractor and the Contractor shall promptly make all required corrections.

#### 1.6 EXAMINATION OF SITE

- A. Examine all Drawings including other Divisions.
- B. Examine all existing conditions and ascertain access to site, available storage and delivery facilities.
- C. Verify all governing dimensions at site and building.

#### 1.7 OBSTACLES, INTERFERENCE AND COOPERATION

- A. Drawings show general design and arrangement. Verify exact location and elevations at the job location. Do not scale plans and diagrams.

- B. Drawings do not show all offsets, fittings, interferences and elevation changes. Adjust installation of pipe, equipment locations, etc. to accommodate Work with the obstacles and interferences. Where rearrangement is necessary, report same to Architect for review. Obtain written acceptance for all changes.
- C. Cooperate with all Contractors and Owner and determine the exact route of all piping and location of all equipment.

#### 1.8 CONCEALMENT

- A. Unless otherwise specifically indicated, all Work shall be concealed above or in ceiling space, in wall space, and elsewhere throughout the building.
- B. In areas with no ceilings, install only after Architect reviews and comments on proposed arrangement and appearance.

#### 1.9 COORDINATION

- A. Review all construction Drawings and coordinate all Shop Drawings with Work specified under all divisions of the specifications. Division 21 is responsible to coordinate and cooperate with other Divisions' Work so that Work can be installed and maintained substantially as called for.

#### 1.10 FLASHING, SEALING AND FIRESTOPPING

- A. Seal where pipes pass through or are affixed to general construction.
- B. Provide flashing, sealing and waterproofing for wall, floor and roof openings without affecting roof guarantee or bond.
- C. Piping entering through waterproof walls, floors and partitions: Provide Thunderline Corporation "Link-Seal" or accepted substitute for sealing the annular space between the pipe and sleeves.
- D. Provide firestopping for openings through fire and smoke barriers, maintaining minimum required rating of floor, ceiling or wall assembly. Refer to Section 210510.

#### 1.11 ACCESS PANELS

- A. Provide for all valves and equipment located in concealed spaces.
- B. Access panels shall be UL rated for walls and/or ceilings they are installed in.

- C. Provided complete by General Construction Division at locations required for repair or maintenance and as required by Code. Quantity, location and size shall be the responsibility of this Division.

#### 1.12 TESTS

- A. Perform operations required for the complete testing of all systems, equipment and related Work as called for.
- B. Perform all tests required by local municipalities, utilities, or other governing bodies, boards or agencies having jurisdiction. Contractor shall be responsible to notify the Owner, in writing, at least one (1) week prior to testing. Provide date and time of testing.

#### 1.13 CONTRACTOR'S CERTIFICATION

- A. All submittals shall bear the Contractor's stamp, certifying the review and approval of submittal, verification of field measurements and compliance with Contract Documents. It shall specifically be as follows:

Contractor acknowledges that all items submitted herein are provided for the base Contract Cost; and that he has reviewed the submittal information contained herein; and that he has determined and verified the materials, field measurements and field construction criteria related thereto, and that he has checked and coordinated the information contained in the submittal with the requirements of all Work in the Contract Documents and other Contracts in the Project.

\_\_\_\_\_  
Contractor's Signature

\_\_\_\_\_  
Date

- B. All submittals without the above certification will be returned, rejected.

END OF SECTION 210000

## SECTION 210503 – FIRE PROTECTION PIPING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Pipe, fittings, and connections for sprinkler system.

#### 1.2 REFERENCES

- A. NFPA 13 – Standard for the Installation of Sprinkler Systems.

#### 1.3 SUBMITTALS

- A. Product Data: Catalog sheets, specifications, installation instructions for each item specified.
- B. Welding performance qualifications and procedures (before any welding is done), signed by Division 21 Contractor.

#### 1.4 QUALITY ASSURANCE

- A. Welding Materials and Procedures: Perform to ASME Code and American Welding Society Standard AWS B2.1, specification for qualification of welding procedures and welders for piping and tubing, NFPA 13.
- B. Bear UL and FM label or marking. Provide manufacturer's name and pressure rating.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store pipe and fittings in shipping containers, with labeling in place.
- B. Provide temporary protective coating on cast iron and steel pipe and fittings.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

## PART 2 - PRODUCTS

### 2.1 STEEL PIPE AND PIPE FITTINGS

- A. Standard Weight, Schedule 40, black steel pipe for ASTM A795, A135 and A-53.
- B. Threaded Piping Fittings: Cast iron, steam pattern, ANSI B16.4; Standard Weight, Class 125.
- C. Flanges and Flange Fittings: Cast iron, Class 125, ANSI B16.1
- D. Grooved Piping Fittings:
  - 1. Couplings: Victaulic Style 005 or Victaulic Co.'s Zero-Flex Style 07, rigid coupling having minimum pressure rating of 300 psi from 1 ¼" and larger.
  - 2. Fittings; by same manufacturer as couplings, having pressure ratings equal to or greater than couplings. Comply with the following standards:
    - a. Steel: ASTM A536 or A106, Grade B.
    - b. Malleable Iron: ASTM A47.
    - c. Grade E EPDM Type A.
  - 3. All Grooved fittings and couplings by one manufacturer.
- E. Welded Pipe and Fittings in accordance with AWSB2.1.
- F. Provide UL and FM approved.
- G. Make: Wheatland or accepted equal.

### 2.2 BRAIDED FLEXIBLE HOSE CONNECTION

#### A. PIPE JOINING MATERIALS

- A. Thread Sealant: Lake Chemical Co.'s Slic-Tite, or Loctite Corp.'s Pipe Sealant with Teflon.
- B. Groove End Piping System Gaskets: Listed type, as recommended and furnished by the coupling/fitting manufacturer.
- C. Gaskets For Use With Ductile Iron Water Pipe: Synthetic rubber rings (molded or tubular): Clow Corp.'s Belltite, Tyler Pipe Industries Inc.'s Ty-Seal, or U.S. Pipe and Foundry Co.'s Tyton.

### 2.3 PIPE SLEEVES, PACKING AND SEALANTS

- A. Sleeves: Schedule 40 steel pipe.

B. Packing and Sealant:

1. Firestopping per Section 21 05 10.
2. Exterior similar to link seal fitting.

2.4 FLOOR, WALL, AND CEILING PLATES

- A. Polished: Solid or split, chrome plated steel or cast brass, with set screw.
- B. Unplated: Solid or split, steel or cast iron, with set screw.

2.5 PACKING MATERIALS FOR BUILDING CONSTRUCTION PENETRATIONS

- A. Mechanical Modular Seals: Thunderline Corp.'s Link Seal wall and floor seals designed for the service of piping system in which installed.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove and collect scale and foreign material, from inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.
- D. Sprinkler piping shall be shop welded. Discs shall be retrieved. A welding procedure shall be prepared and qualified by the contractor before any welding is done. Ensure compliance with NFPA 13, 6.5.2.9. All welds shall be stamped with the identification of the welder or welding machine operator. Coordinate inspection of welding stamps by Owner's Representative prior to installation.

3.2 INSTALLATION

- A. Install piping in strict compliance with NFPA 13 as indicated.
- B. Install piping clear of lights, piping, ducts, beams and all other obstructions.
- C. Install piping to be completely drainable. In case low points cannot be avoided, provide auxiliary drain valve and identify.
- D. Install vertical piping plumb.
- E. Cut pipe square; ream before joining.



- F. Threading: Use American Standard taper pipe thread dies.
- G. Protect piping against damage due to movement.
- H. Provide identification according to Section 210553, Fire Protection Identification.
- I. Do not route piping above electrical equipment, panel, etc.

### 3.3 PIPE JOINT MAKE-UP

- A. Threaded Joint: Make up joints with pipe thread compound applied in accordance with the manufacturer's printed application instructions.
- B. Grooved Pipe Joint: Make up joints with grooved end fittings, and couplings, in conformance with the manufacturer's printed installation instructions.

### 3.4 PIPING PENETRATIONS

- A. Through non-rated wall and stair landing: Provide watertight seal and watertight pipe sleeves.
- B. Through rated wall and floor: Provide firestopping (see Section 210510, Firestopping).
  - 1. Set sleeves in position in formwork. Provide reinforcing around sleeves.
  - 2. Extend sleeves through floors one inch above finished floor level. Caulk sleeves full depth and provide floor plate.
  - 3. Where piping penetrates floor, ceiling, or wall, close off space between pipe and adjacent work with approved fire stopping assembly, insulation and caulk seal air and water tight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
  - 4. Install escutcheons at finished surfaces.
  - 5. Seal sleeves through floors with non-shrinking grout.

### 3.5 SLEEVES

- A. Set sleeves in position in formwork. Provide reinforcing around sleeves.
- B. Extend sleeves through floors 1" above finished floor level. Caulk sleeves full depth and provide floor plate.
- C. Where piping penetrates floor, ceiling or wall, close off space between pipe and adjacent work with approved firestopping assembly, insulation and caulk seal air and water tight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- D. Install escutcheons at finished surfaces.
- E. Seal sleeves through floors with non-shrinking grout.

### 3.6 FLOOR, WALL AND CEILING PLATES

- A. Install plates on exposed piping penetrating floors, walls, and ceilings as follows:
1. In Finished Spaces: Solid or split, polished chrome plated steel or cast brass.
  2. In Unfinished Spaces: Solid or split, unplated steel or cast iron.
  3. Fasten all plates with set screws.
  4. Plates are not required in pipe shafts or furred spaces.

END OF SECTION 210503

## SECTION 210510 – FIRESTOPPING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes field constructed assemblage of firestopping products and materials for the following:
  - 1. Penetrations through fire-rated floor construction.
  - 2. Penetrations through fire-rated walls and partitions.
  - 3. Penetrations through smoke barriers.

#### 1.2 REFERENCE

- A. American Society for Testing and Materials (ASTM) Publications:
  - E 84: Standard Test Methods for Surface Burning Characteristics of Building Materials.
  - E 119: Methods of Fire Tests of Building Construction and Materials.
  - E 814: Standard Method of Fire Tests of Through-Penetration Fire Stops.
  - C 719: Adhesion and Cohesion of Elastomeric Joint Sealants under Cyclic Movements.
  - C 920: Standard Specification of Elastomeric Joint Sealants.
- B. Underwriter's Laboratories Inc. (UL) Publications:
  - UL 263: Fire Tests of Building Construction and Materials.
  - UL 723: Surface Burning Characteristics of Building Materials.
  - UL 1479: Fire Tests of Through-Penetration Firestops.
  - UL 2079: Standard for Fire Tests of Joint Systems.
  - Underwriters Laboratories "Fire Resistance Directory" (Current Year).
- C. Miscellaneous Publications:
  - 1. Factory Mutual Approval Guide (Current Year).
  - 2. Warnock Hersey Certification Listings.

#### 1.3 DEFINITIONS

- A. Fire Rated Assembly: Includes all fire rated walls, floors, floor/ceiling and roof system assemblies. Ratings shall be as per ASTM E 119 or UL 263.
- B. Firestop System: Firestop systems prevent the spread of smoke, fire and toxic gases through openings in the fire rated assemblies or through joints between wall and floor or roof assemblies or other expansion or seismic joints (also known as firesafing), for a specified period of time, incorporating the use of specific products installed in a specific manner.

- C. Flame Spread/Smoke Developed Ratings: Numerical value of a material when tested in accordance with ASTM E 84.
- D. F - Rating: The time period that a through-penetration firestop limits the spread of flame and hot gases through fire resistive construction, including the penetrating items, when tested in accordance with the time-temperature curve defined in ASTM E 119.
- E. T - Rating: The time period that a through-penetration firestop limits temperature rise through the fire resistive construction, including the penetrating items, as defined in ASTM E 119.

#### 1.4 SUBMITTALS

- A. Submit complete list of all firestopping systems and materials to be utilized, including documentation of UL or FM Classifications or approved third party testing. Include all of the individual materials required for each complete system. Indicate manufacturer's product name and number for each material.
- B. Submit copies of manufacturer's product data, specifications, recommendations, standard details and installations instructions for all firestop assemblies.

#### 1.5 QUALITY ASSURANCE

- A. Installations shall be performed by an experienced firestopping contractor who is certified, licensed or otherwise qualified by the firestopping manufacturer to install the manufacturer's products as per specified requirements.
- B. Single-Source Responsibility: Where possible, obtain through-penetration firestop systems for each kind of penetration and construction condition indicated from a single manufacturer.

#### 1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver firestopping products to Project site in original, unopened containers or packages with intact and legible manufacturer's labels identifying product and manufacture; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to project; curing time and mixing instructions for multicomponent materials.
- B. Store and handle firestopping materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants or other causes.
- C. Conspicuously mark "REJECTED" on materials which have been damaged and remove from the site.
- D. Material Safety Data Sheets (MSDS) will be available on the site for all materials. Follow manufacturer's guidelines for use, handling and disposal.

## 1.7 PROJECT CONDITIONS

- A. Environmental Conditions: Do not install firestopping when ambient or substrate temperatures are outside limits permitted by firestopping manufacturers or when substrates are wet.
- B. Ventilation: Ventilate firestopping per firestopping manufacturer's instructions by natural means or, where this is inadequate, forced air circulation.
- C. Coordinate Work: Coordinate construction of openings and penetrating items with other Divisions to ensure that designated through-penetration firestop systems are installed per specified requirements.

## 1.8 WARRANTY

- A. All firestop and firesafing materials shall be warranted, in writing, by the manufacturer against any defects in materials and manufacturing.
- B. Completed installation shall be warranted, in writing, by the installer against defects in workmanship.

## 1.9 ENVIRONMENTAL REQUIREMENTS

- A. All materials shall be asbestos free and non-carcinogenic.
- B. Firestop materials shall contain no flammable or toxic solvents and shall not produce toxic or flammable outgassing during the drying or curing process.
- C. Firestop materials used shall not require solvent based chemicals for clean-up purposes.
- D. Water-based, non-toxic firestop materials shall be used.
- E. Firestop Materials shall be low-VOC (Volatile Organic Compounds)

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with requirements, provide products from one of the following manufacturers as shown below:
  - 1. Rectorseal 'Flamesafe' (design make).
  - 2. 3M Company.
  - 3. Dow Corning.
  - 4. Metacaulk.
  - 5. STI.
  - 6. Hilti.

## 2.2 PHYSICAL REQUIREMENTS

- A. Through-penetration firestop systems and firestop devices shall be tested in accordance with ASTM E 814 using F and T- ratings, shall be classified for use with the particular type of penetrating material used, and shall maintain the same integrity as the fire barrier being sealed.
- B. All products used shall be water-resistant after drying or curing and shall be unaffected by high humidity, condensation or transient water exposure.
- C. Penetrations containing loose electrical, data, or communications cabling shall be protected using firestopping systems that allow unrestricted cable changes without damage to the seal.
- D. Maximum flame spread of 25 and smoke development of 50 when tested in accordance with ASTM E 84 (except intumescent moldable putty).
- E. All materials shall have a minimum one year shelf life.
- F. Materials and system designs shall not require ampacity derating in power cable installations.
- G. Materials supplied under this specification shall be compatible with all materials used in the building construction.

## 2.3 MATERIALS

- A. Water-based thixotropic firestop sealant available in caulkable, trowelable or pourable formulations; Flamesafe FS 900 Series.
- B. Water-based, elastomeric, intumescent firestop sealant; Flamesafe FS 1900.
- C. Intumescent, moldable firestop putty; Flamesafe FS 1000-1077-1100 Series.
- D. Pre-engineered, plant fabricated, self-sealing firestop collar device manufactured from galvanized steel lined with a heat-activated intumescent moldable putty. Device to be installed on the job site with no additional component fabrication required; Flamesafe Firestop Collar Device System.
- E. Reusable heat expanding bags used as a permanent firestop system; Flamesafe or KBS Sealbags.
- F. Cementitious, firestop compound, job site mixed either by hand or using mortar or plastering machine with a worm gear type pump. Designed for large penetrations; Flamesafe Mortar.
- G. Safing sealant in curtain wall joints and other construction joints to stop smoke, gas and fire migration; Flamesafe C700 Sealant.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Examine adjoining construction and the conditions under which the Work is to be completed. Do not proceed with Work until any unsatisfactory conditions detrimental to the proper and timely completion of the Work have been corrected.
- B. Verify that openings and items (penetrations) passing through them are ready to receive the Work of this Section.
- C. Verify that field dimensions are as shown on the drawings and as recommended by the manufacturer.

### 3.2 PREPARATION

- A. Surface cleaning: Clean out openings and joints immediately prior to installing firestopping to comply with recommendations of firestopping manufacturer and the following requirements:
  - 1. Remove all foreign materials from surfaces of opening and joint substrates and from penetrating items that could interfere with adhesion of firestopping.
  - 2. Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.
  - 3. Remove laitance and form release agents from concrete.
- B. Priming: Prime substrates where recommended by firestopping manufacturer using that manufacturer's recommended products and methods. Confine primers.

### 3.3 INSTALLATION

- A. Comply with the through-penetration firestop manufacturer's installation instructions and drawings pertaining to products and applications indicated.
- B. Confirm all requirements of the specific through-penetration system used prior to installation of any elements of the Work. Verify material, maximum diameter, minimum weight, installation thickness/density, annular space, etc.
- C. Coordinate with fire protection and other trades to assure that all pipe, conduit, cable and other items which penetrate fire rated construction have been permanently installed prior to installation of firestops and smoke seals. Schedule and sequence work to assure partitions and other construction which would conceal penetrations are not erected prior to the installations of firestop, firesafing and smoke seals.
- D. Apply firestops and smoke seals in all locations required by national, municipal and local governing laws and codes.

- E. Apply firestopping materials only when the temperature of the surfaces to be filled and surrounding air temperature comply with the manufacturer's printed instructions.
- F. Personal safety gear shall be utilized in accordance with manufacturer's instructions, material and environmental considerations.

### 3.4 FIELD QUALITY CONTROL

- A. Verify that system(s) are installed in all specified and/or indicated locations in rated assemblies.
- B. Verify that proper, specified firestopping materials are used in the firestop system and that system is installed in strict accordance with the latest independent testing agency or manufacturer's latest published requirements.
- C. Install forming/damming materials and other accessories of types required to support fill materials during their application and in the position needed to produce the cross-sectional shapes and depths required to achieve fire ratings of designated through-penetration firestop systems. After installing fill materials, remove forming materials and other accessories not indicated as permanent components of firestop systems.
- D. Install fill materials for through-penetration firestop systems by proven techniques to produce the following results:
  - 1. Completely fill voids and cavities formed by openings, forming materials, accessories and penetrating items.
  - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
  - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes. Install any covering materials or finish as per design requirements and manufacturer's instructions.
- E. The penetration of any walls or partitions by any wiring or cables without conduit is not permitted. No bare wire penetrations are permitted.
- F. After installation, properly identify all firestop systems. Identification shall occur at location where system has been installed and shall include:
  - 1. Identify the firestopping system that has been installed as being a "Rated Through-Penetration Firestop System - Do Not Disturb".
  - 2. Use label, minimum 3" by 5", yellow and black OSHA colors with manufacturers, building owner representative and/or contractor clearly identified.
- G. Do not proceed to enclose firestopping with other construction until local building inspectors have inspected the Work and given approval to close the Work.
- H. Where necessary, repairs shall be made and repaired installations shall be reinspected.



### 3.5 CLEANING

- A. Clean off excess fill materials and sealants adjacent to openings and joints as Work progresses by methods and with cleaning materials accepted by manufacturers of firestopping products and of products in which opening and joints occur.
- B. Protect firestopping during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to produce firestopping complying with specified requirements.

END OF SECTION 210510

## SECTION 210529 – SUPPORTS AND ANCHORS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Pipe, supports, and associated anchors.
- B. Sleeves and watertight/smoketight seals.

#### 1.2 REFERENCES

- A. Existing Building Code of New York State.
- B. Fire Code of New York State.
- C. UL Listed and FM approved.
- D. NFPA 13 Current Edition

#### 1.3 SUBMITTALS

- A. Submit shop drawings and product data.
- B. Indicate hanger and support framing and attachment methods.

#### 1.4 QUALITY ASSURANCE

- A. Supports for fire protection piping, in conformance with NFPA 13 current edition.
- B. Provide UL and FM approved.
- C. Product Data: Catalog sheets, specifications and installation instructions for each item specified except fasteners.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Hangers and Supports: PHD, Anvil, Michigan, Carpenter & Patterson or accepted equal.

## 2.2 PIPE HANGERS AND SUPPORTS

### A. Hangers, Swivel Ring:

1. Electro-galvanized finish, low carbon steel, steel knurled insert.
2. UL listed and FM approved.
3. Make: PHD #141 and #151.

### B. Hanger Rods:

1. Plain finish, fully threaded studs, low carbon steel.
2. Make: PHD #10.

### C. Riser Clamps:

1. Electro-galvanized finish, low carbon steel.
2. Make: PHD #551.

### D. C-Clamps with Locknuts:

1. Plain finish, low carbon steel.
2. UL listed and FM approved.
3. Make: PHD #350.

## 2.3 SLEEVES

### A. Sleeves for Pipes Through Non-fire Rated Floors: Form with 18 gage galvanized steel.

### B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Schedule 40 steel pipe.

### C. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fireproofing: Prefabricated fire rated sleeves including seals, UL Listed.

## 2.4 MECHANICAL MODULAR SEAL

### A. Manufacturers: Thunderline Corporation, Cooper Industries, RSI or accepted equal.

### B. Interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and wall opening.

### C. Assembled with stainless steel bolts and nuts with pressure plates under each bolt and nut.

### D. Provide size and type of seal to suit application as recommended by the manufacturer's written instructions.

## PART 3 - EXECUTION

### 3.1 PIPE HANGERS AND SUPPORTS

- A. Hanger spacing for horizontal piping per NFPA 13, current edition.
- B. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent Work.
- C. Place a hanger within 12 inches of each horizontal elbow.
- D. Use hangers with 1-1/2 inch minimum vertical adjustment.
- E. Support vertical piping at every floor.
- F. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- G. Support riser piping independently of connected horizontal piping.
- H. Provide two (2) hangers per pipe section joined by grooved couplings.
- I. Provide hanger support for pipe arm over greater than 24" horizontal length.
- J. Provide hanger of a type that will prevent upward movement at end of all branch line.

### 3.2 INSERTS

- A. Provide inserts for placement in concrete formwork.
- B. Provide inserts for suspending hangers from reinforced concrete construction.
- C. Where inserts are omitted, drill through concrete slab from below and provide thru-bolt with recessed square steel plate or fender washer (size to suit application) and nut flush with top and recessed into and grouted flush with slab.
- D. Provide beam clamps for suspending hangers from structural steel framing and supports.

### 3.3 PIPE HANGERS AND SUPPORTS

- A. Support horizontal piping with maximum hanger spacing and hanger rod diameter per NFPA 13 for the type of pipe material used.
- B. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.

- C. Use hangers with 1½ inch minimum vertical adjustment.
- D. Support vertical piping at every floor.
- E. Support riser piping independently of connected horizontal piping. Do not hang or support one pipe from another pipe or adjacent ductwork or equipment. Do not bend threaded rod.
- F. Provide anchors in existing slab to support all new piping. Type and size as per manufacturer's recommendations for intended purpose.
- G. Install beam clamps only at panel points of open web steel joist construction.
- H. Provide intermediate structural steel members where required by pipe support spacing when attaching to steel frame construction.
- I. Provide epoxy coating for all hangers, supports, threaded rod for piping systems located in corrosive areas. After installation is completed, recoat all scratched or marred surfaces of hangers, supports and threaded rod.

#### 3.4 ANCHORS, RESTRAINTS, RIGID SUPPORTS, STAYS AND SWAY BRACES

- A. Install pipe anchors, restraints and sway braces as located noted on the Drawings. Design anchors so as to permit piping to expand and contract freely in opposite directions, sway from anchor pints. Install anchors independent of all hangers and supports, and in a manner that will not affect the structural integrity of the building.
- B. In grooved end piping systems, install restraints, anchors and rigid supports as recommended by the manufacturer of the grooved end fittings to ensure proper support and alignment of the piping under operating and testing pressures (maximum hanger or support spacing shall be as previously specified).
  - 1. Horizontal piping shall maintain a constant pitch without sags, humps or lateral deflections.
  - 2. Branch piping shall remain perpendicular to main piping and/or risers.
  - 3. Vertical piping shall remain plumb without deflections.
  - 4. Vertical piping shall be rigidly supported, or anchored at both top and bottom, and wherever necessary to prevent movement and/or shearing forces at branch connections.

#### 3.5 SLEEVES

- A. Set sleeves in position in formwork. Provide reinforcing around sleeves.
- B. Extend sleeves through floors one inch above finished floor level. Caulk sleeves full depth and provide floor plate.

- C. Where piping penetrates floor, ceiling, or wall, close off space between pipe and adjacent work with firestopping insulation and caulk seal air and water tight in accordance with Section 21 05 10. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- D. Provide chrome plated brass setscrew held escutcheons at finished wall and floor surfaces.

END OF SECTION 210529

## SECTION 210553 – FIRE PROTECTION IDENTIFICATION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes identification of products, valves, equipment components, devices and piping systems for the sprinkler system, installed under this Division. All control, drain and test connection valves shall be provided with permanently marked weatherproof metal or rigid plastic identification signs.

#### 1.2 REFERENCES

- A. ASME A13.1 – Scheme for the Identification of Piping Systems

#### 1.3 SUBMITTALS

- A. Submit product data comprised of catalog sheets, specifications, installation instructions for each item.
- B. Shop drawings: Submit list of wording, symbols, letter size and color coding for mechanical identification.
- C. Manufacturer's Installation Instructions: Indicated installation instructions, special procedures and installation.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURER

- A. Brady Worldwide, Inc., Milwaukee, WI.
- B. Brimar Industries, Inc., Garfield, NJ.
- C. Craftmark Identification Systems, Fort Worth, TX.
- D. Seton Identification Products, Branford, CT.

#### 2.2 MATERIALS

- A. Color: Unless specified otherwise, conform to ANSI/ASME A13.1.

- B. Plastic Nameplates: Laminated three-layer plastic with engraved red letters on white light contrasting background color. Letters shall be not less than 3/16 inch high.
- C. Metal Valve Tags: Brass with engraved letters prefixed with an "FP". Letters shall be not less than 1/2 inch high for number designation and not less than 1/4 inch high for service designation on a 19 gage, minimum 1½" diameter disc with smooth edges.
- D. Snap-on Markers: One piece wraparound type constructed of precoiled acrylic plastic with clear polyester coating, integral flow arrows, legend printed in alternating directions, no adhesives necessary and 360 degree visibility.
- E. Sign: Non-corrosive aluminum reflective sign for fire department connection and other outdoor materials, components and devices. Lettering shall be minimum 1" high, with raised or engraved lettering on plate.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install plastic nameplates with corrosive-resistant mechanical fasteners or adhesive.
- B. Install labels with sufficient adhesive for permanent.
- C. Install tags with corrosive resistant chain. Number tags consecutively by location.
- D. Install snap-on markers in accordance with manufacturer's instructions.
- E. Identify all control equipment and accessories of sprinkler system, control panels and major control components outside panels with plastic nameplates, labels, etc.
- F. Identify all valves, including drain and auxiliary drain valves, floor control assembly, alarm valve assembly and others whose function is not readily apparent with tags. Include those valves concealed above ceilings.
- G. Identify valves in main and branch piping with tags.
- H. Identify all piping, concealed or exposed, with plastic pipe markers. Identify service and flow direction. 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 "T", at each side of penetration of structure or enclosure, and at each obstruction.
- I. Provide identification on the ceiling for all auxiliary drains.
- J. Sign: Mount above devices or components as required.

END OF SECTION 210553



## SECTION 210593 – CLEANING AND TESTING

### PART 1 - GENERAL

#### 1.1 SUBMITTALS

##### A. Quality Control Submittals

1. Test Reports: Submit Contractors Material and Test Certificate as found in NFPA 13, for above ground piping:
  - a. Type of test.
  - b. Date, time and duration of test.
  - c. Results of test.
  - d. Signature of authority who witnessed test.

#### 1.2 QUALITY ASSURANCE

##### A. Regulatory Requirements:

1. Perform factory testing of factory fabricated equipment in complete accordance with the authorities having jurisdiction and manufacturer's representative.
2. Perform field testing of piping systems in complete accordance with the local utilities, other authorities having jurisdiction and as specified.

#### 1.3 SEQUENCE AND SCHEDULING

- A. Transmit written notification of proposed date and time of operational tests to the Architect/Engineer and the Owner at least five (5) days in advance of such tests.
- B. Perform Cleaning and Testing Work in the presence of the Owner or the Owner's Representative.
- C. Pressure test piping systems at the roughing-in stage of installation, before piping is enclosed by the General Construction Division, and at other times as directed. Perform test operations in sections as required and directed, to progress the work in a satisfactory manner and not delay the general construction of the building.
- D. Valve or cap-off sections of piping to be tested, utilizing valves required to be installed in the permanent piping systems, or temporary valves or caps as required to perform the Work.

#### 1.4 CORRECTIONAL ACTION

- A. Where testing reveals faulty conditions, reconstruct the system and retest the system.

#### 1.5 PROJECT CONDITIONS

- A. Protection: During test work, protect controls, gauges, accessories and other system components which are not designed to withstand test pressures. Do not utilize permanently installed gauges for field testing of systems.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Test Equipment and Instruments: Type and kind as required for the particular system under test.
- B. Test Media: Water.

### PART 3 - EXECUTION

#### 3.1 PRELIMINARY WORK

- A. Thoroughly clean pipe and tubing prior to installation. During installation, prevent foreign matter from entering systems. Prevent if possible and remove stoppages or obstructions from piping and systems.

#### 3.2 FLUSHING OF PIPING

- A. Flushing: In addition to the requirements of NFPA 13, flush new piping before making final connection and before performing hydrostatic test. Flush at rates of flow prescribed in the Contractor's Material and Test Certificate. After making final connections, flush entire system and assure that debris is removed from piping and there are no stoppages or obstructions in the system.

### 3.3 TESTS

- A. Tests: Unless otherwise shown or specified, perform tests in accordance with latest edition of NFPA 13. Complete and Submit the Contractor's Material and Test Certificate for Above Ground Piping as found in NFPA 13, latest edition.
1. Hydrostatic Tests: Hydrostatic test all new work at 200 lbs. for two hours.
  2. Acceptance Tests (per NFPA):
    - a. Waterflow alarm tests utilizing the inspector's test. (Coordinate with fire alarm system).
    - b. Drain down tests.
    - c. Tamper switch tests (Coordinate with Fire Alarm System).
    - d. Main drain test.
  3. Notify the Owner's Representative, Authority having Jurisdiction, and Architect when the Work of this Section is ready for testing a minimum of 72 hours in advance.
  4. Perform the tests when directed, and must be witnessed by Owner's Representative, Architect/Engineer and local authority.
- B. Test Certificates: Provide/submit all test certificates signed by Owner's Representative and Sprinkler Contractor.

END OF SECTION 210593

## SECTION 211300 – SPRINKLER SYSTEMS

### PART 1 – GENERAL

#### 1.1 SUMMARY

- A. This Section includes information and general construction criteria for an automatic fire protection sprinkler system, comprised of the following:
- B. System design, installation and certification.

#### 1.2 REFERENCES

- A. Current NFPA 13 – National Fire Protection Association Standard for the Installation of Sprinkler Systems, current edition.
- B. Existing Building Code and Fire Code of New York State.
- C. Local Authority Having Jurisdiction.
- D. Manufacturer's instructions.

#### 1.3 SYSTEM DESCRIPTION

- B. Provide hydraulically calculated system designed per NFPA 13 Ordinary Hazard, Group 1 occupancy requirements.

#### 1.4 SUBMITTALS

- A. Shop Drawings:
  - 1. Indicate layout of finished ceiling areas indicating sprinkler locations coordinated with ceiling installation. Indicate detailed pipe layout, hangers and supports, sprinklers, components and accessories. Indicate system controls.
  - 2. Submit floor plans, details, elevations, etc. and layout showing any proposed deviation from the Contract Drawings.

- B. Product Data: Submit data on sprinklers, valves, and specialties, including manufacturers catalog sheets, specifications and installation instructions. Submit performance ratings, rough-in details, weights, support requirements, and piping connections. Each product shall be UL listed and FM approved. Include the following additional information:
1. Electrical Devices: Complete description of intended use, wiring diagrams, data plate information and, in the case of switching devices, whether normally on, or normally off; include motor test data.
  2. Mechanical Devices: Complete description of intended use, including normal operating capacities and working pressures.
  3. Enclosures: Dimensions, materials, gages of metals; type of door hinges and locks, and methods of securing the enclosure members to the building construction.
- C. Quality Control Submittals:
1. Division 21 shall provide computer hydraulic calculations based on Light Hazard design at the hydraulically most remote areas of the first floor. Provide 15 gpm minimum sprinkler discharge.
  2. Design Data: The sprinkler system has been sized in accordance with NFPA 13 sprinkler design requirements for Hydraulically Designed Systems.
  3. Contractor's/Installer's Qualification Certificates.
  4. Installers/Welders Qualification Data:
    - a. Name of each person who will be performing the Work.
    - b. Upon request, furnish names and addresses of the required number of similar projects that each person has worked on which meet the experience criteria.
- D. Shop Drawings Signed and sealed by a New York State Licensed Fire Protection Engineer.
- E. Contract Closeout Submittals:
1. Operation and Maintenance Data:
    - a. Instruction manuals describing the components of the system, servicing requirements, operation and maintenance of the system.
    - b. Replacement parts and availability list for each mechanical and electrical device.
    - c. Publication NFPA 25, Inspection, Testing, and Maintenance of Sprinkler Systems.
  2. Contractor's Material and Test Certificates.
  3. Project Record Drawings: Record actual locations of sprinklers and deviations of piping from Drawings. Indicate drain and test locations.
  4. Computer hydraulic calculations.
  5. Signed and sealed by Signed and sealed by a New York State Licensed Fire Protection Engineer.

## 1.5 QUALITY ASSURANCE

- A. Qualifications: The persons employed to perform the Work of this Section and their supervisor shall be personally experienced in sprinkler work and shall have been regularly performing such work for a minimum of 5 years while in the employ of a company or companies engaged in the installation of sprinkler system.
  - 1. Upon request, furnish to the Consultant the names and addresses of five similar projects, which the foregoing people have worked on during the past 3 years.
- B. Regulatory Requirements: Materials for the Work of this Section shall be Underwriter's Laboratories listed, and/or Factory Mutual approved.
- C. Certification: All certificates shall be signed by Owner's Representative and the Division 15-FP Contractor.
- D. Signed and sealed by a NICET Level 3 or higher.

## 1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and protect products to site.
- B. Store products in shipping containers and maintain in place until installation.
- C. Provide piping with temporary inlet and outlet caps. Maintain caps in place until installation.

## 1.7 EXTRA MATERIALS

- A. Provide minimum of spare sprinkler heads per NFPA requirements.
  - 1. Six (6) spare sprinkler heads of that type if 6 heads installed.
  - 2. Five (5) spare sprinkler heads of that type if 5 heads installed.
  - 3. Four (4) spare sprinkler heads of that type if 4 heads installed.
  - 4. Three (3) spare sprinkler heads of that type if 3 heads installed.
  - 5. Two (2) spare sprinkler heads of that type if 2 heads installed.
  - 6. One (1) spare sprinkler head of that type if 1 head installed.
  - 7. One sprinkler head wrench to fit each type sprinkler head listed above.
- B. Provide suitable wrenches for each sprinkler type.
- C. Provide metal storage cabinet in location designated.
- D. Provide list on door of storage cabinet. List shall include items listed in NFPA 13, and shall include:
  - 1. Quantity of each type of sprinkler in cabinet

2. General Description
3. Issue date of list
4. Sprinkler Identification Number (SIN), or Make and Model of sprinkler.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Grinnell
- B. Reliable
- C. Tyco
- D. Viking
- E. All equipment shall be UL and FM approved.

### 2.2 SPRINKLER HEADS

#### A. General Ceiling:

1. Type: Sprinkler shall be UL listed and FM approved as quick response concealed pendant.
2. K Factor: 5.6
3. Temperature: Sprinkler 155°F, solid flat cover plate 139°F.
4. Thread Size: ½" NPT.
5. Head Finish: Brass with white paint cover plate finish. Provide air and dust seal.
6. Working Pressure: 250 psi maximum at the sprinkler.
7. Fusible Link: Glass bulb.
8. Make: Tyco. Model: Royal Flush II or accepted equal.
9. Sprinkler Wrench: Provide matching wrench per type of sprinkler.

#### B. Exposed Area Type:

1. Type: Standard Spray, standard response for compact storage area, upright type.
2. Head Finish: Chrome plated.
3. Fusible Link: Glass bulb type, temperature rated for specific area hazard.
4. Size: 1/2", K factor = 5.6, 155°F/200°F.
5. Make: Tyco, Model: TY-FRB or accepted equal.

## 2.3 SPARE SPRINKLER HEAD CABINET

- A. Steel, with hinged cover, constructed of minimum 20- gauge material and fitted with 16 gage steel racks designed to hold quantities and types of spare sprinkler heads with matching wrenches
- B. Finish: Bright red, baked on enamel.
- C. Label on door of cabinet. List shall include items listed in NFPA 13, and shall include:
  - 1. Quantity of each type of sprinkler in cabinet
  - 2. General Description
  - 3. Issue date of list
  - 4. Sprinkler Identification Number (SIN), or Make and Model of sprinkler heads.

## 2.4 SIGNS

- A. Non-corrosive steel with vitreous enamel finish, lettering on contrasting background to identify and indicate the function of:
  - 1. Control valves, alarm valves.
  - 2. Drain, test, check valves, auxiliary drain.
  - 3. Hydraulic Design Nameplate Data: Size approximately 9 x 12 inches, inscribed with the following:
    - a. SPRINKLER SYSTEM HYDRAULICALLY DESIGNED (in block letters).
    - b. Location and area of hydraulically designed section.
    - c. Classification of hazard and discharge density over designed area in gallons per minute.
    - d. Residual pressure at base of riser supplying water to designed section.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install all Work of this Section in accordance with national, state and local codes, NFPA 13 and the manufacturer's instructions.
- B. All valves shall be lockable. Lock and chain all valves in open position with approved chain looped through handwheel and around adjacent sprinkler pipe. Secure with padlock, all keyed alike. Lock all test valves and other valves in closed position with padlock, all keyed alike.
- C. Install signs identifying the following:
  - 1. Control Valves: One for each size, type and function.



2. Hydraulically Designed System.

- D. Install piping in concealed spaces above finished ceilings.
- E. Place pipe runs to minimize obstruction with other Work. Install pipes so that system may be completely drained. Provide auxiliary drain and identification below ceiling at all low points.
- F. Provide additional sprinkler(s) where required due to obstructions (e.g. columns, beams, soffits, ductwork, piping, conduit, light fixtures, exit signs, toilet/shower partitions, supports, etc.). Coordinate with final MEP layout. Located sprinklers minimum distances from heat sources in compliance with NFPA 13.
- G. Provide sprinkler(s) above and below obstructions over 4'-0" wide, whether shown on Drawings or not.
- H. Center sprinkler heads in two directions in ceiling tile and provide piping offsets as required.
- I. Apply masking tape or paper cover to sprinklers, coverplates, and sprinkler escutcheons that do not receive field painted finish. Remove after painting. Replace painted sprinklers with new.
- J. Provide and secure spare sprinkler head cabinet to building wall or other permanent structure per Owner, unless otherwise directed.
- K. Flush entire 1<sup>st</sup> floor piping system within renovated area of foreign matter. Filling the system with nitrogen gas prior to charging the system with water.
- L. Hydrostatically test entire system.
- M. Install pipe identification markings for all system piping spaced at every 10'- 0" for piping 2" and smaller and at every 15'- 0" for piping 2½" and larger.
- N. Require test be witnessed by Owner's Representative, Authority Having Jurisdiction.

3.2 FIELD QUALITY CONTROL

- A. Tests: Unless otherwise shown or specified, perform tests in accordance with latest edition of NFPA 13.
  - 1. Flushing: In addition to the requirements of the Standard, flush new piping before making final connection and before performing hydrostatic test. Flush at rates of flow prescribed in the Contractor's Material and Test Certificate. After making final connections, flush entire system and assure that debris is removed from piping and there are no stoppages or obstructions in the system.
  - 2. Hydrostatic Tests: Hydrostatic test all new work at 200 lbs. for two hours.

3. Acceptance Tests (per NFPA):

- a. Flow alarm tests inspector's test. (Coordinate with fire alarm system).
- b. Drain down tests.
- c. Tamper switch tests (Coordinate with Fire Alarm System).
- d. Main drain test.

- 4. Notify the Owner's Representative and Architect when the Work of this Section is ready for testing a minimum of 72 hours in advance.
- 5. Perform the tests when directed, and must be witnessed by Owner's Representative, Architect/Engineer and local authority.

- B. Test Certificates: Provide/submit all test certificates signed by owner's representative and Sprinkler Contractor.

3.3 OPERATION AND MAINTENANCE

- A. Provide operation and maintenance data to include all test reports and inspection data, per Section, OPERATION AND MAINTENANCE DATA.
- B. Training:
  - 1. Provide start-up, operation and service training for all installed equipment to the Owner's personnel who will be responsible for the operation of the equipment.
  - 2. Upon completion of training, provide a record of completed training to the Consultant in accordance with Division 1 Section 01790, DEMONSTRATION AND TRAINING.

END OF SECTION 211300

## SECTION 220000 - GENERAL REQUIREMENTS FOR DIVISION 22

### PART 1 - GENERAL

#### 1.1 BID AND CONTRACT DOCUMENTS

- A. All Work in this Division is subject to the provisions of the General Conditions, Supplementary General Conditions and Requirements of Division 1 General Requirements.
- B. By submitting the bid, the Contractor acknowledges that he has not received any verbal directives from the Owner, Architects and Engineers (and their employees and sub-consultants) at any time before, during or after the bid. He further acknowledges that he has verified with all his sub-contractors, suppliers, vendors, and their representatives that they have not received any verbal directives from the Owner, Architects and Engineers (and their employees and sub-consultants) at any time before, during or after the bid. The Contractor further acknowledges that all changes to the Bid Documents have been only in the form of formal addendum.
- C. By starting Work on this project, the Contractor acknowledges that all directives, field orders and change order will be only from the Owner or his Designated Representative and only in writing. All other directives verbal or otherwise will be at the Contractor's own risk.

#### 1.2 SCOPE OF WORK

- A. The scope of this Work includes plumbing systems for the project as indicated on the Contract Documents, including, but not limited to the following:
  - 1. Removal of existing plumbing piping & equipment as indicated on Drawings.
  - 2. Sanitary, waste and vent piping, and domestic water piping and connections to existing systems were indicated on Drawings.
  - 3. Plumbing fixtures and accessories, where indicated on Drawings.
  - 4. Gas piping.
  - 5. Insulation of all new Work as specified.
  - 6. Identification of systems.
  - 7. All necessary cutting, patching and firestopping.
  - 8. Cleaning and testing as specified.
  - 9. Miscellaneous items shown and/or specified.

#### 1.3 PERMITS AND INSPECTIONS

- A. Permits: Division 22 shall acquire all required permits required for execution of the Work of this Division and shall pay all fees and charges for same.

#### 1.4 CODES AND STANDARDS

- A. Building Code of New York State: Provide all Work in compliance with and meet the requirements of the latest issue.
- B. Standards: All equipment shall meet all the requirements of ANSI, NEMA, AWWA, ASME, and ASPE Standards.
- C. Listing: All equipment and devices for which Underwriters Laboratories has a listing service, shall be UL listed and bear the UL listing label.
- D. All materials and installation shall comply with:
  - 1. Building Code of New York State.
  - 2. Existing Building Code of New York State.
  - 3. Energy Conservation Construction Code of New York State.
  - 4. Fire Code of New York State.
  - 5. Mechanical Code of New York State.
  - 6. Fuel Gas Code of New York State.
  - 7. National Fire Protection Association (NFPA).
  - 8. New York State Department of Labor Rules and Regulations.
  - 9. Americans with Disabilities Act.
  - 10. Local Utilities.
  - 11. Authorities Having Jurisdiction.
  - 12. Federal and State Occupational Safety and Health Administration.
  - 13. Local Municipality Codes and Ordinances.
- E. In case of conflict between the Contract Documents and the requirements of any Code or Authorities Having Jurisdiction, the most stringent requirements of the aforementioned shall govern.
- F. Should this Division perform any Work that does not comply with the requirements of the applicable Building Codes, State Laws, Local Ordinances, Industry Standards and/or Power Company regulations, he shall bear all costs arising in correcting the deficiencies, as approved by the Architect/Owner.

#### 1.5 LOCAL AUTHORITY HAVING JURISDICTION (AHJ)

- A. This Document does not supercede any Code, local or otherwise. All Contractors must be aware of any local requirements and Codes that may affect this project. The AHJ will make all final decisions concerning all code interpretations. Any discrepancies must be reported to the Architect or Engineer within 24 hours. Any code violations are the responsibility of the Contractor and the Contractor shall promptly make all required corrections.

## 1.6 SUBMITTALS

- A. Submit Shop Drawings on all items of equipment and materials to be furnished and installed as required, arranged by specification section number. Include review stamp and table of contents/bill of materials. Do not combine materials from different specification sections.
- B. If submitting electronically, in addition to the requirements above, provide one (1) single-sided color hard copy of every submittal required directly to the Engineer. This includes submittal drawings that are larger than 11" x 17". Reduced scale photocopies will not be acceptable. Failure to abide by these requirements will result in an immediate ACTION C – REVISE AND RESUBMIT without review. All individual items and options within the submittal shall be clearly highlighted or otherwise identified.
- C. Operation and maintenance manuals and record drawings shall not be submitted electronically. Provide hard copies only; one (1) copy shall be sufficient.
- D. Listed manufacturers and their series and/or model numbers do not imply unconditional specification approval. The series and/or model numbers listed may not be current or correct, but are included as an acceptable series of products that must still comply with the written description and specification. Provision of products, based solely on model numbers listed in the specifications does not constitute automatic acceptance. Approved submittals of all product data are still required.

## 1.7 QUALITY ASSURANCE

- A. Install all Work true to line and grade, parallel and close to walls and parallel to lines of building and maintaining maximum headroom. Do not install piping, equipment, etc. across doors, windows or other openings.
- B. All equipment shall be accessible for operation, service, etc.
- C. All equipment and material shall be new, unused and without any defects.

## 1.8 PROTECTION OF PERSONS AND PROPERTY

- A. Make provisions to prevent moisture and foreign matter from entering piping, equipment, etc.
- B. Contractor shall be responsible for all damages until Work is fully accepted. Replace all damaged equipment and material.
- C. Assume responsibility for construction safety at all times. Include, as part of contract, all trench or building shoring, scaffolding, shielding, dust protection, mechanical/electrical protection, safety railings, barriers and other safety features required to provide safe conditions for all workmen and site visitors.

1.9 EXAMINATION OF SITE

- A. Examine all Drawings including other Divisions.
- B. Examine all existing conditions and ascertain access to site, available storage and delivery facilities.
- C. Verify all governing dimensions at site and building.

1.10 OBSTACLES, INTERFERENCE AND COOPERATION

- A. Drawings show general design and arrangement. Verify exact location and elevations at the job location. Do not scale plans and diagrams.
- B. Drawings do not show all offsets, fittings, interferences and elevation changes. Adjust installation of pipe, equipment locations, etc. to accommodate Work with the obstacles and interferences. Where rearrangement is necessary, report same to Architect for review. Obtain written acceptance for all changes.
- C. Cooperate with all Contractors and Owner and determine the exact route of all piping and location of all equipment.

1.11 CONCEALMENT

- A. Unless otherwise specifically indicated, all Work shall be concealed above or in ceiling space, in wall space, in crawl spaces and elsewhere throughout the building.
- B. In areas with no ceilings, install only after Architect reviews and comments on proposed arrangement and appearance.

1.12 COORDINATION

- A. Review all construction Drawings and coordinate all Shop Drawings with Work specified under all divisions of the specifications. Division 22 is responsible to coordinate and cooperate with other Divisions' Work so that Work can be installed and maintained substantially as called for.
- B. Under no circumstances shall this Division route any piping or other equipment foreign to the electrical installation in the dedicated equipment space located directly above both new and existing electrical panelboards and electrical equipment, which is a violation of the National Electrical Code (NEC) Article 110.26(E)(1). Failure to adhere to this requirement will necessitate removal and relocation or rerouting of said piping by this Division at no additional cost to the Owner or other trades.

1.13 OPENINGS, SLEEVES AND CHASES

- A. Certain chases, openings and shafts will be provided as shown as part of General Construction Plans and Specifications.
- B. Provide all other openings and sleeves for pipe, etc. through floors, walls, partitions, ceilings, roofs, etc. for Division 22 Work.
- C. Assume responsibility for correct and final location and size of such openings: furnish templates if required. Correct improperly located and sized or omitted chases and openings as required. Plug all abandoned sleeves left as part of this Division.

1.14 FLASHING, SEALING AND FIRESTOPPING

- A. Seal where pipes pass through or are affixed to general construction.
- B. Provide flashing, sealing and waterproofing for wall, floor and roof openings without affecting roof guarantee or bond.
- C. Piping entering through waterproof walls, floors and partitions: Provide Thunderline Corporation "Link-Seal" or accepted substitute for sealing the annular space between the pipe and sleeves.
- D. Provide firestopping for openings through fire and smoke barriers, maintaining minimum required rating of floor, ceiling or wall assembly. Refer to Section 22 05 10.

1.15 CUTTING AND PATCHING

- A. Contractor shall do all cutting and patching of existing surface required for installation of Work installed under this Contract.
- B. Repaired surfaces shall match existing surface.
- C. Method of cutting shall be approved by the Architect.

1.16 PAINTING

- A. Prepare surfaces of Work installed under this Division by cleaning, removing rust, etc.
- B. Paint all exposed Work in existing areas to match existing conditions.

1.17 ACCESS PANELS

- A. Provide for all valves and equipment located in concealed spaces.

- B. Access panels shall be UL rated for walls and/or ceilings they are installed in.
- C. Provided complete by General Construction Division at locations required for repair or maintenance and as required by Code. Quantity, location and size shall be the responsibility of this Division. Coordinate location with General Construction Division.

#### 1.18 STORAGE AND PROTECTION OF MATERIALS

- A. Store materials on base, minimum 6" above ground or floor. Equip with waterproof or windproof cover for items subject to moisture damage.
- B. Store in orderly manner so as not to interfere with other Work or obstruct access to buildings or facilities.
- C. Replace items stolen or damaged at no cost to the Owner.

#### 1.19 EQUIPMENT CONNECTIONS

- A. Provide complete piping connections to all equipment as called for on Drawings and as specified.
- B. Obtain approved roughing diagrams and exact location of equipment for items furnished under other Divisions of the specifications. Do not rough in without approved Drawing.

#### 1.20 CONTINUITY OF SERVICE

- A. Building will be used by Owner during the construction period.
- B. Keep all systems operative; make temporary connections as required.
- C. Do not shut off any service without written permission from the Owner or Owner's Representative. Schedule systems shutdown with Owner, providing a minimum of one (1) week notice, in writing, at least one (1) week prior to testing. Provide date and time of testing.

#### 1.21 TESTS

- A. Perform operations required for the complete testing of all systems, equipment and related Work as called for.
- B. Perform all tests required by local municipalities, utilities, or other governing bodies, boards or agencies having jurisdiction.



1.22 OWNER INSTRUCTIONS

- A. Instruct designated Owner's personnel on the proper operation and care of systems and equipment, before final acceptance of the Work. Obtain written acknowledgement from person instructed prior to final payment. Submit to Architect with final acceptance request.

1.23 CONTRACTOR'S CERTIFICATION

- A. All submittals shall bear the Contractor's stamp, certifying the review and approval of submittal, verification of field measurements and compliance with Contract Documents. It shall specifically be as follows:

Contractor acknowledges that all items submitted herein are provided for the base Contract Cost; and that he has reviewed the submittal information contained herein; and that he has determined and verified the materials, field measurements and field construction criteria related thereto, and that he has checked and coordinated the information contained in the submittal with the requirements of all Work in the Contract Documents and other Contracts in the Project.

\_\_\_\_\_  
Contractor's Signature

\_\_\_\_\_  
Date

- B. All submittals without the above certification will be returned, rejected.

END OF SECTION 220000

## SECTION 220510 – FIRESTOPPING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes field constructed assemblage of firestopping products and materials for the following:
  - 1. Penetrations through fire-rated floor construction.
  - 2. Penetrations through fire-rated walls and partitions.
  - 3. Penetrations through smoke barriers.

#### 1.2 REFERENCE

- A. American Society for Testing and Materials (ASTM) Publications:
  - E 84: Standard Test Methods for Surface Burning Characteristics of Building Materials.
  - E 119: Methods of Fire Tests of Building Construction and Materials.
  - E 814: Standard Method of Fire Tests of Through-Penetration Fire Stops.
  - C 719: Adhesion and Cohesion of Elastomeric Joint Sealants under Cyclic Movements.
  - C 920: Standard Specification of Elastomeric Joint Sealants.
- B. Underwriter's Laboratories Inc. (UL) Publications:
  - UL 263: Fire Tests of Building Construction and Materials.
  - UL 723: Surface Burning Characteristics of Building Materials.
  - UL 1479: Fire Tests of Through-Penetration Firestops.
  - UL 2079: Standard for Fire Tests of Joint Systems.
  - Underwriters Laboratories "Fire Resistance Directory" (Current Year).
- C. Miscellaneous Publications:
  - 1. Factory Mutual Approval Guide (Current Year).
  - 2. Warnock Hersey Certification Listings.

#### 1.3 DEFINITIONS

- A. Fire Rated Assembly: Includes all fire rated walls, floors, floor/ceiling and roof system assemblies. Ratings shall be as per ASTM E 119 or UL 263.

- B. Firestop System: Firestop systems prevent the spread of smoke, fire and toxic gases through openings in the fire rated assemblies or through joints between wall and floor or roof assemblies or other expansion or seismic joints (also known as firesafing), for a specified period of time, incorporating the use of specific products installed in a specific manner.
- C. Flame Spread/Smoke Developed Ratings: Numerical value of a material when tested in accordance with ASTM E 84.
- D. F - Rating: The time period that a through-penetration firestop limits the spread of flame and hot gases through fire resistive construction, including the penetrating items, when tested in accordance with the time-temperature curve defined in ASTM E 119.
- E. T-Rating: The time period that a through-penetration firestop limits temperature rise through the fire resistive construction, including the penetrating items, as defined in ASTM E 119.

#### 1.4 SUBMITTALS

- A. Submit complete list of all firestopping systems and materials to be utilized, including documentation of UL or FM Classifications or approved third party testing. Include all of the individual materials required for each complete system. Indicate manufacturer's product name and number for each material.
- B. Submit copies of manufacturer's product data, specifications, recommendations, standard details and installations instructions for all firestop assemblies.

#### 1.5 QUALITY ASSURANCE

- A. Installations shall be performed by an experienced firestopping contractor who is certified, licensed or otherwise qualified by the firestopping manufacturer to install the manufacturer's products as per specified requirements.
- B. Single-Source Responsibility: Where possible, obtain through-penetration firestop systems for each kind of penetration and construction condition indicated from a single manufacturer.

#### 1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver firestopping products to Project site in original, unopened containers or packages with intact and legible manufacturer's labels identifying product and manufacture; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to project; curing time and mixing instructions for multi-component materials.

- B. Store and handle firestopping materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants or other causes.
- C. Conspicuously mark "REJECTED" on materials that have been damaged and remove from the site.
- D. Material Safety Data Sheets (MSDS) will be available on the site for all materials. Follow manufacturer's guidelines for use, handling and disposal.

#### 1.7 PROJECT CONDITIONS

- A. Environmental Conditions: Do not install firestopping when ambient or substrate temperatures are outside limits permitted by firestopping manufacturers or when substrates are wet.
- B. Ventilation: Ventilate firestopping per firestopping manufacturer's instructions by natural means or, where this is inadequate, forced air circulation.
- C. Coordinate Work: Coordinate construction of openings and penetrating items with other Divisions to ensure that designated through-penetration firestop systems are installed per specified requirements.

#### 1.8 WARRANTY

- A. All firestop and firesafing materials shall be warranted, in writing, by the manufacturer against any defects in materials and manufacturing.
- B. Completed installation shall be warranted, in writing, by the installer against defects in workmanship.

#### 1.9 ENVIRONMENTAL REQUIREMENTS

- A. All materials shall be asbestos free and non-carcinogenic.
- B. Firestop materials shall contain no flammable or toxic solvents and shall not produce toxic or flammable outgassing during the drying or curing process.
- C. Firestop materials used shall not require solvent based chemicals for clean-up purposes.
- D. Water-based, non-toxic firestop materials shall be used in lieu of silicone or solvent based materials.

- E. Products allowing silicones/silicas to become airborne before or during a fire shall not be used when electronic switching devices or painting operations are located within the same building.

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with requirements, provide products from one of the following manufacturers as shown below:
  - 1. International Protective Coatings Corporation (design make).
  - 2. 3M Company.
  - 3. Dow Corning.
  - 4. Metacaulk.
  - 5. STI.
  - 6. Flamesafe
  - 7. Hilit

### 2.2 PHYSICAL REQUIREMENTS

- A. Through-penetration firestop systems and firestop devices shall be tested in accordance with ASTM E 814 using F and T- ratings, shall be classified for use with the particular type of penetrating material used, and shall maintain the same integrity as the fire barrier being sealed.
- B. All products used shall be water-resistant after drying or curing and shall be unaffected by high humidity, condensation or transient water exposure.
- C. Penetrations containing loose electrical, data, or communications cabling shall be protected using firestopping systems that allow unrestricted cable changes without damage to the seal.
- D. Maximum flame spread of 25 and smoke development of 50 when tested in accordance with ASTM E 84 (except intumescent moldable putty).
- E. All materials shall have a minimum one year shelf life.
- F. Materials and system designs shall not require ampacity derating in power cable installations.
- G. Materials supplied under this specification shall be compatible with all materials used in the building construction.

## 2.3 MATERIALS

- A. Water-based thixotropic firestop sealant available in caulkable, trowelable or pourable formulations; IPC Flamesafe FS 900 Series.
- B. Water-based, elastomeric, intumescent firestop sealant; IPC Flamesafe FS 1900.
- C. Intumescent, moldable firestop putty; IPC Flamesafe FS 1000-1077-1100 Series.
- D. Pre-engineered, plant fabricated, self-sealing firestop collar device manufactured from galvanized steel lined with a heat-activated intumescent moldable putty. Device to be installed on the job site with no additional component fabrication required; IPC Flamesafe Firestop Collar Device System.
- E. Reusable heat expanding bags used as a permanent firestop system; IPC Flamesafe or KBS Sealbags.
- F. Cementitious, firestop compound, job site mixed either by hand or using mortar or plastering machine with a worm gear type pump. Designed for large penetrations; IPC Flamesafe Mortar.
- G. Safing sealant in curtain wall joints and other construction joints to stop smoke, gas and fire migration; IPC Flamesafe C700 Sealant.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Examine adjoining construction and the conditions under which the work is to be completed. Do not proceed with work until any unsatisfactory conditions detrimental to the proper and timely completion of the work have been corrected.
- B. Verify that openings and items (penetrations) passing through them are ready to receive the work of this Section.
- C. Verify that field dimensions are as shown on the drawings and as recommended by the manufacturer.

### 3.2 PREPARATION

- A. Surface cleaning: Clean out openings and joints immediately prior to installing firestopping to comply with recommendations of firestopping manufacturer and the following requirements:
  - 1. Remove all foreign materials from surfaces of opening and joint substrates and from penetrating items that could interfere with adhesion of firestopping.

2. Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.
  3. Remove laitance and form release agents from concrete.
- B. Priming: Prime substrates where recommended by firestopping manufacturer using that manufacturer's recommended products and methods. Confine primers.

### 3.3 INSTALLATION

- A. Comply with the through-penetration firestop manufacturer's installation instructions and drawings pertaining to products and applications indicated.
- B. Confirm all requirements of the specific through-penetration system used prior to installation of any elements of the work. Verify material, maximum diameter, minimum weight, installation thickness/density, annular space, etc.
- C. Each Division shall be responsible for firestopping their penetrations. Coordinate Work to assure that all pipe, conduit, cable and other items which penetrate fire rated construction have been permanently installed prior to installation of firestops and smoke seals. Schedule and sequence work to assure partitions and other construction that would conceal penetrations are not erected prior to the installations of firestop, firesafing and smoke seals.
- D. Apply firestops and smoke seals in all locations required by national, municipal and local governing laws and codes.
- E. Apply firestopping materials only when the temperature of the surfaces to be filled and surrounding air temperature comply with the manufacturer's printed instructions.
- F. Personal safety gear shall be utilized in accordance with manufacturer's instructions, material and environmental considerations.

### 3.4 FIELD QUALITY CONTROL

- A. Verify that system(s) are installed in all specified and/or indicated locations in rated assemblies.
- B. Verify that proper, specified firestopping materials are used in the firestop system and that system is installed in strict accordance with the latest independent testing agency or manufacturer's latest published requirements.
- C. Install forming/damming materials and other accessories of types required to support fill materials during their application and in the position needed to produce the cross-sectional shapes and depths required to achieve fire ratings of designated through-penetration firestop systems. After installing fill materials, remove forming materials and other accessories not indicated as permanent components of firestop systems.

- D. Install fill materials for through-penetration firestop systems by proven techniques to produce the following results:
  - 1. Completely fill voids and cavities formed by openings, forming materials, accessories and penetrating items.
  - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
  - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes. Install any covering materials or finish as per design requirements and manufacturer's instructions.
- E. The penetration of any walls or partitions by any wiring or cables without conduit is not permitted. No bare wire penetrations are permitted.
- F. After installation, properly identify all firestop systems. Identification shall occur at location where system has been installed and shall include:
  - 1. Identify the firestopping system that has been installed as being a "Rated Through-Penetration Firestop System - Do Not Disturb".
  - 2. Use label, minimum 3" by 5", yellow and black OSHA colors with manufacturers, building owner representative and/or contractor clearly identified.
- G. Do not proceed to enclose firestopping with other construction until local building inspectors have inspected the Work and given approval to close the Work.
- H. Where necessary, repairs shall be made and repaired installations shall be reinspected.

### 3.5 DUCTWORK PENETRATIONS

- A. Firesafing of duct penetrations in CMU fire/smoke barrier partitions that do not require the use of a fire damper will be provided as follows:
  - 1. CMU partitions will be placed around ductwork to provide gaps up to 1" average clearance on all sides. These gaps are to be filled with intumescent, moldable firestop putty that fills the gap around the duct solid for the full depth of the wall. (See NFPA 90A Paragraph 3 - 4.6.4.).
- B. Firesafing of duct penetrations in drywall fire/smoke barrier partitions that do not require the use of a fire damper will be filled with an elastomeric, intumescent firestop sealant.
- C. Ductwork insulation is not permitted to penetrate any fire/smoke barrier partition. Terminate insulation at the face of the wall, penetrate the wall with the duct and resume use of insulation immediately upon exiting the face of the wall on the opposite side.



### 3.6 CLEANING

- A. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials accepted by manufacturers of firestopping products and of products in which opening and joints occur.
- B. Protect firestopping during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to produce firestopping complying with specified requirements.

END OF SECTION 220510

## SECTION 220523 – VALVES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Valves for the various plumbing systems required to complete Work.

#### 1.2 SUBMITTALS

- A. Product Data: Provide product data on valves and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- B. Submit schedule indicating size and type of valve to be utilized for each system.

#### 1.3 QUALITY ASSURANCE

- A. All valves shall comply with Building Code of New York State.
- B. Manufacturer's name and pressure rating marked on valve body.
- C. All components manufactured for potable water use shall contain no more than a weighted average of 0.25 percent lead with respect to the wetted surfaces of valves and accessories and meet the requirements of NSF/ANSI 372, third-party testing and certification.

#### 1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three years documented experience.
- B. Installer: Company specializing in performing the Work of this Section.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products at site.
- B. Provide temporary protective coating where required.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Valves from one or more manufacturers may be used but all valves supplied for each specific service shall be the product of one manufacturer.
- B. Gate, Globe, Check Valves, and Butterfly Valves: Crane, Jenkins, Kennedy, Nibco, Milwaukee, Stockham, Lunkenheimer, or accepted equal.
- C. Ball, Drain Valves: Crane, Apollo, Jenkins, Nibco or accepted equal.
- D. Plug Valves: Crane, Jenkins, Mueller, Rockwell or accepted equal.
- E. Plastic Valves: Chemtrol, Hayward, Nibco, M&T or accepted equal.

### 2.2 VALVES

- A. Gate Valves:
  - 1. Sizes 2" and Under: 175 PSIG, WOG, bronze body, union bonnet, bronze trim, handwheel, inside screw, double wedge or disk, solder or threaded ends.
- B. Ball Valves:
  - 1. Sizes 2" and Under: 175 PSIG, WOG, 2-piece bronze body, full port, stainless steel ball, Teflon seats, and stuffing-box ring, lever handle, solder or threaded ends.
- C. Plug Valves:
  - 1. Sizes 2" and Under: 125 PSIG bronze body, bronze spring washer, brass plug, square head, lubricated, threaded ends.
  - 2. Provide valve wrench for each type and size.
- D. Drain Valves:
  - 1. Bronze two-piece body, 175 PSI WOG, chrome plated brass ball, Teflon seats and stuffing box ring, lever handle,  $\frac{3}{4}$ " brass hose connection with cap and chain.
- E. Plastic Valves
  - 1. Ball Valves:
    - a. Ultra-pure polyvinylidene fluoride (PVDF) Schedule 40, 150 psi at 85 F and 85 psi at 140 F, true union type with socket ends, Viton or EPDM seals, reinforced stainless steel Teflon coated shaft.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Prepare piping systems installation in accordance with manufacturer's recommendation for particularly type of system installed.
- B. Remove dirt, scale, or any foreign matter from inside and outside of pipe prior to assembly.

### 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install valves with stems upright.
- C. Install valves at locations noted on drawings or specified.

### 3.3 APPLICATION

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Install gate or ball valve for shut off on vertical risers and to isolate equipment, fixtures.
- C. Install globe or ball valve for throttling, by-pass, or manual flow control services.
- D. Install drain valve at all low points of water systems and where indicated.

END OF SECTION 220523

## SECTION 220529 – SUPPORTS AND ANCHORS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Pipe and equipment hangers, supports, inserts and associated anchors.
- B. Sleeves and seals.

#### 1.2 REFERENCES

- A. International Building Code.
- B. International Plumbing Code.
- C. UL Listed and FM approved.
- D. Federal Specification WWH-171.
- E. MSS SP-69.
- F. ASTM 123.

#### 1.3 SUBMITTALS

- A. Submit schedule indicating the type and size of hanger utilized for each system.
- B. Product Data: Catalog sheets, specifications and installation instructions for each item specified except fasteners.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Hangers and Supports: PHD, Anvil, Michigan, Carpenter & Patterson or accepted equal.
- B. Epoxy Coatings: PPG, Sherwin Williams, Benjamin Moore or accepted equal.

## 2.2 PIPE HANGERS AND SUPPORTS

### A. Hangers for Pipe Sizes ½ to 1½ Inches:

1. Cadmium plated or galvanized steel, adjustable swivel, split ring type.
2. Cadmium plated or galvanized steel, adjustable swivel ring type with secured insulation shield.
3. Provide high bond chemical resistant, epoxy coated hangers in all corrosive areas, minimum 8.0 mil thickness.

### B. Hangers for Pipe Sizes 2 to 8 Inches:

1. Cadmium plated or galvanized steel, adjustable standard clevis type.
2. Cadmium plated or galvanized steel, adjustable standard clevis type with secured insulation shield.
3. Provide high bond chemical resistant, epoxy coated hangers in all corrosive areas, minimum 8.0 mil thickness.

### C. Multiple or Trapeze Hangers:

1. 12 gage galvanized steel channel, 1-5/8" x 1" with 9/16" diameter holes on 1-7/8" centers.
2. Galvanized steel pipe/tube clamp with securing bolt and nut, sized for piping being supported.
3. Galvanized steel pipe/tube clamp with EPDM cushion, securing bolt and nut, sized for piping being supported.
4. Galvanized steel strut nut with spring, thread sized to match supporting rod.

### D. Wall and Vertical Supports for Pipe:

1. Cadmium plated or galvanized iron extension split clamp.
2. Cadmium plated or galvanized steel-offset pipe clamp.
3. Cadmium plated or galvanized steel standard pipe clamp.
4. Cadmium plated or galvanized steel riser pipe clamp.
5. Cadmium plated or galvanized steel wall bracket with wall bracket clip.
6. Provide high bond chemical resistant, epoxy coated hangers in all corrosive areas, minimum 8.0 mil thickness.

### E. Shield for Insulated Piping 2 Inches and Smaller: 18 gage galvanized steel shield over insulation in 180 degree segments, minimum 12 inches long at pipe support.

1. Provide high bond chemical resistant, epoxy coated hangers in all corrosive areas, minimum 8.0 mil thickness.

### F. Shield for Insulated Piping 2½ Inches and Larger (Except Cold Water Piping): Pipe covering protective saddles.

1. Provide high bond chemical resistant, epoxy coated hangers in all corrosive areas, minimum 8.0 mil thickness.

- G. Shields for Insulated Cold Water Piping 2½ Inches and Larger: Hard block non-conducting saddles in 90-degree segments, 12 inch minimum length, block thickness same as insulation thickness.
- H. Refer to Section 220700 for insulation schedule.

## 2.3 HANGER RODS

- A. Steel Hanger Rods: Cadmium plated threaded both ends, threaded one end, or continuous threaded.
- B. High bond, chemical resistant, epoxy coated hanger rods in all corrosive areas, minimum 8.0 mil thickness.

## 2.4 INSERTS

- A. 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.
  - 1. For use in solid concrete or solid block of thickness required for application.
  - 2. Make: Rawl steel drop-in anchor or accepted equal.
- B. Carbon steel or stainless-steel expansion anchor pre-assembled sleeve style anchor sized for application. The anchors shall have a nylon compression ring and triple tinned expansion sleeve. Carbon steel components shall be plated.
  - 1. For use in concrete block, pre-cast concrete plank, solid concrete or solid concrete block of thickness required for application.
  - 2. Make: Rawl "Lok/Bolt" type anchor or accepted equal.

## 2.5 SLEEVES

- A. Sleeves for Pipes Through Non-fire Rated Floors: Form with 18 gage galvanized steel.
- B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Schedule 40 steel pipe.
- C. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fireproofing: Prefabricated fire rated sleeves including seals, UL Listed.
- D. Provide high bond chemical resistant, epoxy coating on all exposed area of sleeves located in corrosive areas. Minimum 8.0 mil thickness.

## 2.6 MECHANICAL MODULAR SEAL

- A. Manufacturers: Thunderline Corporation, Cooper Industries, RSI or accepted equal.
- B. Interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and wall opening.
  - 1. Assembled with stainless steel bolts and nuts with pressure plates under each bolt and nut.
  - 2. ASTM D2000 M3 BA510 EPDMF for standard and corrosive service.
  - 3. ASTM D2000 M1 BF510 nitrile for oil resistance service.
  - 4. ASTM D2000 M1 GE505 silicone for high or low temperature service.
  - 5. Provide size and type of seal to suit application as recommended by the manufacturer's written instructions.

## 2.7 BEAM CLAMPS

- A. Cadmium plated or galvanized steel C-clamp with hardened steel cup point set screw with locknut. Size for load, beam flange width and rod size required.
- B. High bond chemical resistant, epoxy coated C-clamps in all corrosive areas, minimum 8.0 mil thickness.
- C. Cadmium plated or galvanized iron beam clamp with hardened steel clip point set screw with locknut, sized for load, beam flange width and rod size required.
- D. High bond chemical resistant, epoxy coated hangers in all corrosive areas, minimum 8.0 mil thickness.

## 2.8 FABRICATION

- A. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- B. Design hangers large enough to accept insulation shield and be removed without disengagement of supported pipe.

## 2.9 FINISH

- A. Corrosive Areas: Provide white epoxy coating insulated piping and white materials. Provide gray epoxy coating for other systems.
- B. Provide copper plated hangers and supports where used to support copper piping.
- C. Provide chrome plated hangers and supports where used to support chrome piping.



## 2.10 FASTENERS

- A. Bolts, Nuts, Washers, Lags and Screws: Cadmium plated or galvanized, size and type to suit application.

## PART 3 - EXECUTION

### 3.1 INSERTS

- A. Provide inserts for placement in concrete formwork.
- B. Provide inserts for suspending hangers from reinforced concrete construction.
- C. Where inserts are omitted, drill through concrete slab from below and provide thru-bolt with recessed square steel plate or fender washer (size to suit application) and nut flush with top and recessed into and grouted flush with slab.
- D. Provide beam clamps for suspending hangers from structural steel framing and supports.

### 3.2 PIPE HANGERS AND SUPPORTS

- A. Support horizontal piping as follows:

PIPE SIZE	MAX. HANGER SPACING	HANGER ROD DIAMETER
½" to 1¼"	5'- 0"	3/8"
1½" to 2"	8'- 0"	3/8"
2½" to 3"	10'- 0"	½"
4" to 5"	10'- 0"	5/8"
Cast Iron (Bell and Spigot (or No-Hub)	5'- 0" and at all offsets	Provide for pipe size as indicated above

- B. Install hangers to provide minimum ½ inch space between finished covering and adjacent work.
- C. Place a hanger within 12 inches of each offset, branch line and at all floor drain P-traps and at the base of risers.
- D. Use hangers with 1½ inch minimum vertical adjustment.
- E. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers and at all offsets and at the base of all risers.
- F. Support vertical piping at every floor. Support vertical cast iron pipe at each floor and at intervals of eight feet where elevation is greater between floors.

- G. Where several pipes other than drainage piping can be installed in parallel and at same elevation, provide multiple or trapeze hangers. Spacing of hangers shall be based upon smallest pipe being supported. Provide pipe/tube clamps with cushion when supporting copper pipe or tubing.
- H. Support riser piping independently of connected horizontal piping. Do not hang or support one pipe from another pipe or adjacent ductwork or equipment. Do not bend threaded rod.
- I. Provide anchors in existing slab to support all new piping. Type and size as per manufacturer's recommendations for intended purpose.
- J. Provide oversized hangers to accept insulation shields, wood block or dowel filter and saddles. Refer to specification Section 22 07 00 for piping insulation schedule.
- K. Provide insulation shield at each hanger supporting insulated piping.
- L. Install beam clamps only at panel points of open web steel joist construction.
- M. Provide intermediate structural steel members where required by pipe support spacing when attaching to steel frame construction.
- N. Provide epoxy coating for all hangers, supports, threaded rod for piping systems located in corrosive areas. After installation is completed, recoat all scratched or marred surfaces of hangers, supports and threaded rod.

### 3.3 ANCHORS, RESTRAINTS, RIGID SUPORTS, STAYS AND SWAY BRACES

- A. Install pipe anchors, restraints and sway braces as located noted on the Drawings. Design anchors so as to permit piping to expand and contract freely in opposite directions, sway from anchor pints. Install anchors independent of all hangers and supports, and in a manner that will not affect the structural integrity of the building.
- B. In grooved end piping systems, install restraints, anchors and rigid supports as recommended by the manufacturer of the grooved end fittings to ensure proper support and alignment of the piping under operating and testing pressures (maximum hanger or support spacing shall be as previously specified).
  - 1. Horizontal piping shall maintain a constant pitch without sags, humps or lateral deflections.
  - 2. Branch piping shall remain perpendicular to main piping and/or risers.
  - 3. Vertical piping shall remain plumb without deflections.
  - 4. Vertical piping shall be rigidly supported, or anchored at both top and bottom, and wherever necessary to prevent movement and/or shearing forces at branch connections.

C. Cast Iron Soil Piping Systems:

1. Where piping is suspended on centers in excess of 18 inches by means of non-rigid hangers, provide sway braces, of design, number and location in accordance with the Cast Iron Soil Pipe Institute's Cast Iron Soil Pipe and Fittings Handbook to prevent horizontal pipe movement.
2. Additionally, brace piping 5 inches and larger to prevent horizontal movement and/or joint separation. Provide braces, blocks, rodding or other suitable method at each branch opening, or change of direction in accordance with the Cast Iron Soil Pipe Institute's Cast Iron Soil Pipe and Fittings Handbook to prevent horizontal pipe movement.

3.4 SLEEVES

- A. Set sleeves in position in formwork. Provide reinforcing around sleeves.
- B. Extend sleeves through floors one inch above finished floor level. Caulk sleeves full depth and provide floor plate.
- C. Where piping penetrates floor, ceiling, or wall, close off space between pipe and adjacent work with firestopping insulation and caulk seal air and water tight in accordance with Section 078400. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- D. Provide chrome plated brass setscrew held escutcheons at finished wall and floor surfaces.

END OF SECTION 220529

## SECTION 220553 – PLUMBING IDENTIFICATION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Identification of Plumbing products, valves, equipment and piping systems installed under Division 22.

#### 1.2 REFERENCES

- A. ANSI/ASME A13.1 – Scheme for the Identification of Piping Systems.

#### 1.3 SUBMITTALS

- A. Submit product data for plumbing identification.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS:

- A. Seton, Brimer Industries, Brady Corporation, Kolbi Pipe Marker Co., or accepted equal.

#### 2.2 MATERIALS

- A. Color: Unless specified otherwise, conform with ANSI/ASME A13.1.
- B. Plastic Nameplates: Laminated three-layer plastic with engraved black letters on light contrasting background color. Minimum size 6" x 4". Equal to Seton M0927 Series.
- C. Brass Valve Tags: Brass with engraved black letters prefixed with a "Plbg". Tag size minimum 1 1/2" diameter with stainless steel beaded chain to secure to valve.
- D. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Color to match system being identified and printed markings indicating flow direction arrow and fluid or gas being conveyed.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Plastic Nameplates: Install with corrosive-resistant mechanical fasteners, or adhesive.
- B. Brass Valve Tags: Install with stainless steel beaded chain.
- C. Plastic Pipe Markers: Install in accordance with manufacturer's instructions.
- D. Valves: Identify valves' function in main and branch piping with tags. Provide a self-adhesive vinyl label at all locations where valves are located above a suspended ceiling. Provide color to match system being identified. Install on ceiling grid under valve.
- E. Piping: Identify piping, exposed, concealed and at each access panel in concealed areas, with plastic pipe markers. Identify service and flow direction. Install in clear view and save where pipelines are located above or below the normal line of vision, the lettering shall be placed below or above the horizontal centerline of the pipe. Locate identification not to exceed 20 feet on straight runs at branches, risers and drops, adjacent to each valve and in each room or space less than 20 feet.

END OF SECTION 220553

## SECTION 220593 – CLEANING AND TESTING

### PART 1 – GENERAL

#### 1.1 SUBMITTALS

##### A. Quality Control Submittals

1. Test Reports: Submit test results on Test Records for all systems tested. Include the following:
  - a. Type of test.
  - b. Date, time and duration of test.
  - c. Results of test.
  - d. Signature of authority who witnessed test.

#### 1.2 QUALITY ASSURANCE

##### A. Regulatory Requirements:

1. Perform factory testing of factory fabricated equipment in complete accordance with the authorities having jurisdiction and manufacturer's representative.
2. Perform field testing of piping systems in complete accordance with the local utilities, other Authorities Having Jurisdiction and as specified.

#### 1.3 SEQUENCE AND SCHEDULING

- A. Transmit written notification of proposed date and time of operational tests to the Architect/Engineer and the Owner at least five (5) days in advance of such tests.
- B. Perform Cleaning and Testing Work in the presence of the Owner or the Owner's Representative.
- C. Pressure test piping systems at the roughing-in stage of installation, before piping is enclosed by the General Construction Division, and at other times as directed. Perform test operations in sections as required and directed, to progress the Work in a satisfactory manner and not delay the general construction of the building.
- D. Valve or cap-off sections of piping to be tested, utilizing valves required to be installed in the permanent piping systems, or temporary valves or caps as required to perform the Work.

#### 1.4 CORRECTIONAL ACTION

- A. Where testing reveals faulty conditions, reconstruct the system and retest the system.

#### 1.5 PROJECT CONDITIONS

- A. Protection: During test work, protect controls, gauges, accessories and other system components which are not designed to withstand test pressures. Do not utilize permanently installed gauges for field testing of systems.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Test Equipment and Instruments: Type and kind as required for the particular system under test.
- B. Test Media (air, water, gas): As specified for the particular piping or system under test.
- C. Cleaning Agent: As specified for the particular piping, apparatus or system being cleaned.

### PART 3 - EXECUTION

#### 3.1 PRELIMINARY WORK

- A. Thoroughly clean pipe and tubing prior to installation. During installation, prevent foreign matter from entering systems. Prevent if possible and remove stoppages or obstructions from piping and systems.
- B. Thoroughly clean compressed air, control air, refrigerant pipe and similar system prior to pressure or vacuum testing.

#### 3.2 PRESSURE TESTS – PIPING

- A. Piping system shall be tight under test and shall not show loss in pressure or visible leaks, during test operations or after the minimum duration of time as specified. Remove piping which is not tight under test; remake joints and repeat test until no leaks occur.

B. Water Systems:

1. Domestic water (potable cold, domestic hot and recirculation) inside buildings:

- a. Before fixtures, faucets, trim and accessories are connected, perform hydrostatic test at 125 psig for 2 hours.
- b. After fixtures, faucets, trim and accessories are connected, perform hydrostatic retest at 75 psig for 2 hours.

C. Gas Piping: Before concealment, perform air test of duration and pressure as required by the local gas company. However, for gas piping designed for pressures of from 4" to 6" water column, air test at 15" HG for one hour, without drop in pressure. Test gas piping with air only. Check joints for leaks with soap suds.

D. Air Piping:

1. Compressed Air: Test with air at 150 psig for one hour.
2. Control Air: Test with air at 50 psig for one hour.
3. Check joints for leaks with soap suds.

E. Vacuum Piping: Perform air test at 150 psig for one hour, followed by a vacuum test of 25" HG for one hour, during which time the mercury shall remain stationary for the last 30 minutes of the test.

F. Drainage and Vent Piping: Perform tests before fixtures are installed. Test by filling the entire system with water, and allowing to stand for 3 hours, with no noticeable loss of water. Test joints under a minimum head of 10 feet of water, except the uppermost section. Test the uppermost section to overflowing.

3.3 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Prior to starting Work, verify system is complete, flushed and clean.
- B. Ensure PH of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or hydrochloric acid.
- C. Inject disinfectant, free chlorine in liquid, powder, tablet, throughout system to obtain 50 to 80 mg/1 residual.
- D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 % of outlets.
- E. Maintain disinfectant in system for 24 hours.
- F. If final disinfectant residual tests less than 24 mg/1, repeat treatment.
- G. Flush disinfectant from system until residual is equal to that of incoming water or 1.0 mg/1.



- H. Take samples no sooner than 24 hours after flushing, from 5 % of outlets and from water entry, and analyze in accordance with AWWA C651.

END OF SECTION 220593

## SECTION 220700 – INSULATION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Insulation of all domestic cold, hot water, hot water recirculating.

#### 1.2 REFERENCES

- A. ASTM C547 – Mineral Fiber Preformed Pipe Insulation.
- B. ANSI/ASTM C195 - Mineral Fiber Thermal Insulation Cement.
- C. ASTM C449 - Mineral Fiber Hydraulic-setting Thermal Insulating and Finishing Cement.
- D. ASTM C534 - Flexible Elastomeric Foam.
- E. ASTM E84 - Surface Burning Characteristics of Building Materials.
- F. NFPA 255 - Surface Burning Characteristics of Building Materials.
- G. UL 723 - Surface Burning Characteristics of Building Materials.
- H. International Plumbing Code.
- I. International Energy Conservation Code.
- J. International Building Code.

#### 1.3 SUBMITTALS

- A. Include product description. Submit schedule with list of materials and thickness for each service, and locations.
- B. Submit manufacturer's installation instructions.
- C. Submit samples if requested.

#### 1.4 QUALITY ASSURANCE

- A. Applicator: Company specializing in piping insulation application with five successfully completed projects of similar scope.

- B. Materials: Flame spread rating of 25 or less and a smoke developed rating of 50 in accordance with ASTM E84.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manville.
- B. Certainteed.
- C. Owens-Corning.
- D. Accepted Equal.

### 2.2 PIPE INSULATION

- A. Fiberglass: Glass fiber insulation 4 # density. Conform with FS HH-I-558B, Form D, Type III, Class 12 and ANSI/ASTM C547; "k" value of 0.24 at 75°F; non-combustible.
- B. Flexible Elastomeric Foam: Chemically expanded unicellular elastomeric material conforming to ASTM C534, possessing the following physical properties:
  - 1. Pipe Insulation: Density of 5 to 7 pcf; a thermal conductivity (k value at 75°F of 0.28 maximum; operating temperature range of -20°F to 200°F.
  - 2. Sheet Insulation: Density of 6 pcf; a thermal conductivity (k value at 75° F of 0.28 maximum; operating temperature range of -20°F to 200°F.

### 2.3 JACKET MATERIAL

- A. All Purpose Jacket: Vapor barrier type, factory or field applied over fiberglass insulation, comprised of a Kraft paper outer cover bonded to aluminum foil, and reinforced with fiberglass yarn. Jacket material shall be treated for permanent fire and smoke resistance. A vapor barrier jacket seal shall be accomplished with a 1½" longitudinal flap, and 3" wide butt strips, factory supplied, for making circumferential joints.
  - 1. Fire and Smoke Hazard Classification Rating (composite, including jacket and adhesive, ASTM E-84):
    - a. Flame Spread: 25 or less.
    - b. Smoke Developed: 50 or less.
  - 2. Water Vapor Permeability (ASTM E-96): 0.02 perm.
  - 3. Tensile Strength: 40 lb./in. width.
  - 4. Mullen Burst: 70 psi.

## 2.4 FITTING INSULATION

### A. Fiberglass Insulation System:

1. Pre-molded fitting insulation: Same thickness as the adjacent pipe covering.
  - a. Conform to FS-HH-I-558B, Form E, Class 16.
2. PVC/Fiberglass Fitting Insulation: Polyvinylchloride pre-molded flexible fitting cover with batt type, pre-cut fiberglass insert.
  - a. PVC: Conform with FS L-P-535C, Composition A, Type II, Grade GU.
  - b. Fiberglass: Conform with FS-HH-I-558B, Form B, Type I, Class 7&8.
3. Miter Cut Fitting Insulation: Fabricated from materials employed for pipe insulation.

### B. Flexible Elastomeric Foam Insulation System: Miter cut fitting insulation, fabricated from materials employed for pipe insulation.

## 2.5 MISCELLANEOUS MATERIALS

### A. Adhesive:

1. Vapor Barrier Jacket Adhesive: Foster Products Division, 85-20, Childers, CP-82, Epolux, Cad-o-prene, 400.
2. Canvas Jacket Adhesive: Foster Products Division, 30-36, Childers, CP-50; Epolux, Cadalag 336.
3. Reinforcing Membrane Adhesive: Foster Products Division 30-36; Childers, CP-50; Epolux, Cadalag 336.
4. Flexible Elastomeric Foam Adhesive: Foster Products Division, 85-75; Epolux, Cad-o-prene, 448; Armstrong 520.

### B. Joint Sealant for Fiberglass Insulation: Foster Products Division 30-45; Childers CP-30; Epolux 670.

### C. Vapor Barrier Coating: Foster Products Division 30-35; Childers CP-30; Epolux 670.

### D. Cement:

1. Insulating Cement: ASTM C195, asbestos free.
2. Finishing Cement: ASTM C449/C449M.

### E. Reinforcing Membrane:

1. Polyester Cloth: 8 x 8 mesh per sq. in., 0.7 oz. per sq. yd.; Foster Products Division, Mast-a-fab.
2. Glass Yarn Cloth: 20 x 20 mesh per sq. in.; Johns-Manville, Duramesh fabric.

- F. Sealing Tape: Vapor barrier, color matching, of same material as the pipe or fitting cover to which applied; as manufactured by Arno Inc., Compac Corp., Fasson Adhesive Co.; or as recommended by the manufacturer of the jacket material to which applied.
- G. Banding Wire: Steel, 20 gage, galvanized; annealed.
- H. Thumb Tack Fastener: Stainless steel, with serrated shank.
- I. Wood Blocks: Hardwood, preservative treated; 1" wide, 3" minimum length; inner and outer surfaces contoured to fit the curvature of the pipe, and insulation shield.
- J. Wood Dowel Plugs: Hard wood, preservative treated.
- K. Shield: 18 gage galvanized steel shield, 180 degree segment, 12" long.
- L. Insulate d Saddle: 9" phenolic foam insulation sized to match piping insulation with a 6" steel shield with bottom rib to fit inside clevis hanger.

## 2.6 HANDI-CAP FIXTURES

- A. Insulation kit for cold and hot water supplies, drain and P-trap.
  - 1. McGuire Prowrap insulation kit, Model #PW2000 and accessory # PWWC as required, or accepted equal.
  - 2. Color: White

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Install materials after piping has been tested and accepted.
- B. All Work to be clean and dry before installing insulation.

### 3.2 GENERAL INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Continue insulation with vapor barrier through non-fire rated assemblies.
- C. In exposed piping, locate insulation and cover seams in least visible locations.
- D. On insulated piping with vapor barrier, insulate fittings, valves, unions, flanges and strainers.

- E. On insulated piping without vapor barrier and piping conveying fluids 140° F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation at such locations.
- F. Provide an insert, not less than 6" long, of same thickness and contour as adjoining insulation, between support shield and piping, but under the finish jacket, on piping 2" diameter or larger, to prevent insulation from sagging at support points. Inserts shall be cork or other heavy density insulating material suitable for the planned temperature range. Factory fabricated inserts may be used.
- G. Neatly finish insulation at supports, protrusions and interruptions.
- H. Jackets:
  - 1. Indoor, Concealed Applications: Insulated pipes conveying fluids above ambient temperature shall have all service jackets, with or without vapor barrier, factory-applied or field-applied. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish. PVC jackets may be used.
  - 2. Indoor, Concealed Applications: Insulated piping conveying fluids below ambient temperature including cold water and roof conductors shall have vapor barrier, all service jackets with self-sealing lap, factory-applied. Insulate fittings, roof drain bodies, joints, and valves with molded insulation of like material and thickness as adjacent pipe, and finish with glass cloth and vapor barrier adhesive. PVC jackets may be used.

### 3.3 INSTALLATION OF FIBERGLASS INSULATION

- A. Seal jacket longitudinal flap with vapor barrier jacket adhesive. Rub out all wrinkles and smooth excess sealant flush with outer surface of jacket.
- B. Apply a coating of vapor barrier jacket adhesive to each section of insulation to be joined, and apply butt strips in like manner as above. Apply butt strips to overlap 1½" on each side of the sections joined.
- C. PVC/Fiberglass Fitting Insulation: Tuck the ends of the pre-cut insulation batt snugly into the throat of the fitting, and tuck-in the edges adjacent to the pipe insulation. Install fitting cover and seal as follows:
  - 1. Cold Service Insulation: Seal the overlap in the throat of the fitting cover, and the butt joint of the cover with the adjacent pipe insulation, with 2" wide sealing tape (a product of the fitting cover manufacturer). Extend the tape 1" over the adjacent pipe insulation and overlap upon itself at least 2" on the downward side.
  - 2. Hot Service Insulation: Secure the cover with outward clinch staples, thumb tack fasteners, or sealing tape.

- D. Pre-Molded and Miter cut Fitting Insulation: Insulate to the same thickness as the adjoining pipe insulation. Apply joint sealant to the mating edges of the sections, and to the butt joint. Secure sections together with banding wire; bend twisted ends into the insulation. Apply a leveling coat of insulating cement to fill the voids and smooth irregularities.
  - 1. Cold Service Insulation: Cover fitting insulation with two  $\frac{1}{8}$ " thick applications of vapor barrier coating, with a layer of reinforcing membrane bedded between coats. Lap membrane at least 2" over itself, and the adjacent pipe insulation. Apply a 6 ounce canvas jacket over the fitting, secured with adhesive. Lap canvas at least 2" over itself, and the adjacent pipe insulation.
    - a. Omit canvas on concealed installations.
  - 2. Hot Service Insulation: Apply a 6-ounce canvas jacket to the fitting insulation, secured with adhesive. Lap canvas at least 2" over itself.
    - a. Omit canvas on concealed installations.

### 3.4 INSTALLATION OF FLEXIBLE ELASTOMERIC FOAM INSULATION

- A. Where possible, slip insulation over the pipe, and seal butt joints with adhesive. Where the slip-on technique is not possible, slit the insulation and install; re-seal with adhesive, making sure the mating surfaces are completely joined.
- B. Insulate fittings and valves with miter cut sections. Use templates provided by the manufacturer, and assemble the cut sections in accordance with the manufacturer's printed instructions.
  - 1. Insulate threaded fittings and valves with sleeved fitting covers. Overlap and seal the covers to the adjoining pipe insulation.
- C. Carefully mate and seal with adhesive all contact surfaces to maintain the integrity of the vapor barrier of the system.

### 3.5 INSTALLATION AT HANGERS

- A. Reset and realign hangers and supports if they are displaced while installing the piping insulation.
- B. Install insulation filler pieces at all hangers for cold service piping, to prevent crushing the insulation.
  - 1. Fiberglass Insulation: Use insulated clevis hangers specified with built-in filler pieces.

2. Flexible Elastomeric Foam Insulation: Install wood blocking or wood dowel plug filler pieces of the same thickness as the insulation. Slot the insulation, insert the filler pieces between the pipe and insulation shield, and secure in place with adhesive.

- C. Provide insulation shield or insulated saddle on all hangers to prevent damage to insulation.

### 3.6 INSULATION SHIELDS/INSULATED SADDLES

- A. Provide on all hangers to prevent damage to insulation.

1. Secure to hanger to prevent movement.

### 3.7 PIPING INSULATION SCHEDULE

PIPING	INSULATION TYPE	PIPE SIZE	INSULATION THICKNESS
Domestic Cold Water: Above Ground	Glass Fiber Flexible or Elastomeric Foam	1" and under	½"
		1¼" and over	1"
Domestic Hot Water: Supply	Glass Fiber Flexible or Elastomeric Foam	1¼" and under	1"
		1½" and over	1½"
Domestic Hot Water: Recirculation	Glass Fiber or Flexible Elastomeric Foam	1¼" and under	1"
		1½" and over	1½"

END OF SECTION 220700



## SECTION 221000 – PLUMBING PIPING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Pipe, fittings and joints for the various plumbing systems required to complete Work.

#### 1.2 REFERENCES

- A. ANSI B31.9 – Building Service Piping.
- B. ASME Sec. 9 – Welding and Brazing Qualifications.
- C. B16.1 – Cast Iron Pipe Flanges and Flanged Fittings Class 25, 125, 250 and 800.
- D. B16.3 – Malleable Iron Threaded Fittings.
- E. ASME B16.4 – Cast Iron Threaded Fittings Class 125 and 250.
- F. B16.18 – Cast Bronze Solder-Joint Pressure Fittings.
- G. B16.22 – Wrought Copper and Bronze Solder-Joint Pressure Fittings.
- H. B16.23 – Cast Copper Alloy Solder-Joint Drainage Fittings - DWV.
- I. B16.29 – Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings – DWV.
- J. ASTM A47 – Ferritic Malleable Iron Castings.
- K. ASTM A53 – Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.
- L. ASTM A74 – Cast Iron Soil Pipe and Fittings.
- M. ASTM A120 – Pipe, Steel, Black and Hot Dipped Zinc Coated Galvanized, Welded and Seamless, for Ordinary Uses.
- N. ASTM B32 – Solder Metal.
- O. ASTM B75 – Seamless Copper Tube.
- P. ASTM B88 – Seamless Copper Water Tube, Type K annealed.
- Q. ASTM B251 – Wrought Seamless Copper and Copper-Alloy Tube.

- R. ASTM B306 – Copper Drainage Tube (DWW).
- S. ASTM C564 – Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- T. AWWA C651 – Disinfecting Water Mains.
- U. CISPI 301 – Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary Systems.
- V. CISPI 310 – Joints for Hubless Cast Iron Sanitary Systems.
- W. ANSI/AWWA C104/A21.4 – Ductile Iron Water Piping – Cement Mortar Lining.
- X. ANSI/AWWA C110, C111/A21.10, A21.11 – Ductile Iron Fittings and Joints.
- Y. ASTM D1248 – Polyethylene Pipe and Fittings.
- Z. ASTM D2146 – Polypropylene Pipe and Fittings.
- AA. ASTM D2665 – Polyvinyl Chloride (PVC) Pipe and Fittings.
- BB. ASTM D3222 – Polyvinyl Dene Fluoride (PVDF) Pipe and Fittings.
- CC. ASTM D2661 – Acrylonitrile – Butadiene – Styrene (ABS) Pipe and Fittings.

### 1.3 SUBMITTALS

- A. Product Data: Provide data on pipe materials, pipe fittings, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- B. Provide schedule indicating type of material to be utilized for each system.

### 1.4 QUALITY ASSURANCE

- A. All piping shall comply with International Plumbing Code.
- B. Welding and brazing materials and procedures shall comply to ASME Code and applicable State Labor Regulations.
- C. All components manufactured for potable water use shall contain no more than a weighted average of 0.25 percent lead with respect to the wetted surfaces of piping, fittings, accessories and meet the requirements of NSF/ANSI 372, third-party testing and certification.

## 1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three years documented experience.
- B. Installer: Company specializing in performing the Work of this Section, with a minimum of 5 years' experience.
- C. Upon request, furnish names and addresses of similar projects that each person has worked on which meet the experience criteria.

## 1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products at site.
- B. Provide temporary protective coating where required.
- C. Protect all piping systems from entry of foreign materials by temporary end caps, closures on pipe, fittings and valves until installation of system is complete.

## 1.7 OPERATION AND MAINTENANCE

- A. Provide two "No-Hub" coupling wrenches of type and size required for future service and maintenance. Turn-over to Owner and obtain receipt.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Black/Galvanized Steel Pipe: Allied Tube, Bull Moose, Wheatland Tube Company, Republic Steel, U.S. Steel, or accepted equal.
- B. Copper Pipe and Tubing: Anaconda, Chase, Mueller, Revere or accepted equal.
- C. Cast Iron Pipe and Fittings: American Cast Iron Pipe Co, Tyler Pipe (Subsidiary of Tyler Corp.), Charlotte Pipe and Foundry Co., United States Pipe and Foundry Co., or accepted equal.
- D. No Hub Cast Iron Pipe Couplings: Tyler Pipe (Subsidiary of Tyler Corp.), Charlotte Pipe and Foundry Co., Clamp-All, Anald "Husy", or accepted equal.
- E. Chemical Resistant Pipe and Fittings: Duriron, Enfield, Fuseal, Orion, or accepted equal.
- F. Ductile Iron Pipe: American Cast Iron Pipe Co., United State Pipe and Foundry Co., Atlantic States Cast Iron Pipe Co., or accepted equal.

- G. Plastic Pipe and Fittings: M&T Plastics, Spears, Charlotte Pipe, Nibco, Mueller Industries, Cresline Plastic Pipe Co., or accepted equal.

## 2.2 MATERIALS

A. Sanitary Drainage System:

1. Above Ground Sanitary Waste and Vent Piping:

- a. Cast Iron Pipe and Fittings: CISPI 301, Hubless, service weight.
  - 1) Joints: CISPI 310 Neoprene gasket with stainless steel clamp and shield assemble.
- b. Copper Tube: AASTM-B306, DWV (Not for use on urinal waste).
  - 1) Fittings: ASME B16.23 cast bronze, or ASME B16.26 wrought copper, drainage type.
  - 2) Joints: ASTM B32, solder, grade 95TA.

B. Chemical Drainage System:

1. Above Ground Chemical Waste and Vent Piping

- a. Duriron Pipe and Fittings: ASTM A 518 heavy weight
  - 1) Joints: Hub and Spigot or approved stainless steel clamp assembly.
    - a) Lead with chemical resistant oakum
    - b) One-piece Teflon inner sleeve and Neoprene outer sleeve with stainless steel clamp assembly.

C. Domestic Water System:

1. Above Ground Domestic Water System:

- a. Size 4" and under Copper Pipe ASTM B88, Type L, Hard drawn.
    - 1) Fittings: ASME B16.18 cast bronze, or ASME B16.22 wrought copper, pressure type.
    - 2) Joints: ASTM B32 solder grade 95TA
- OR
- 1) Fittings: ASME B16.18 cast bronze, or ASME B16.22 wrought copper, pressure type with EPDM O-ring seal
  - 2) Joints: Press fit with electro-hydraulic crimping tool.

D. Gas Piping System:

1. Above Ground Gas Piping:

a. Steel Pipe: ASTM A53 or A 120 Schedule 40, black

- 1) Fittings: ASME B16.3 malleable iron.
- 2) Joints:

a) B16.3 screwed (sizes 2" and under)

E. Compressed Air Piping (Low Pressure):

1. Copper Pipe ASTM B88, Type L, Hard drawn.

- a. Fittings: ASME B16.18 cast bronze, or ASME B16.22 wrought copper, pressure type.
- b. Joints: ASTM B32 solder grade 95TA.

F. Deionized Water Piping (Pure Water):

1. Ultra-pure, unpigmented polyvinylidene chloride (PVDF) pipe, ASTM D3222, Schedule 40.

- a. Fittings: ASTM D3222 ultra pure, unpigmented polyvinylidene chloride (PVDF), pressure type.
- b. Joints: ASTM D2657, socket fusion.

G. Vacuum Piping:

1. Copper Pipe: ASTM B42, Type "L", hard drawn.

- a. Fittings: ASME B16.23 cast bronze or ASME B16.26 wrought copper, drainage type.
- b. Joints: ASTM B32, solder, Grade 95TA.

2.3 FLANGES, UNIONS AND COUPLINGS

A. Sizes 2" and Under:

- 1. Ferrous Pipe: 150 psig galvanized or black malleable iron threaded unions.
- 2. Copper Tube and Pipe: 150 psig bronze union soldered.

B. Dielectric Couplings: Galvanized or plated steel union, threaded or soldered end, water impervious isolation barrier.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify location and inverts of existing utilities before starting Work.
- B. Verify all existing conditions at site.
- C. Verify piping routes, elevations, connection points prior to start of Work to insure of proper installation.

### 3.2 PREPARATION

- A. Prepare piping systems installation in accordance with manufacturer's recommendation for particularly type of system installed.
- B. Remove dirt, scale, or any foreign matter from inside and outside of pipe prior to assembly.
- C. Review Division 26 Drawings for location of all electrical panelboards, switchboards and similar electrical equipment as areas to avoid routing plumbing piping haphazardly.

### 3.3 INSTALLATION

- A. Do not route plumbing piping directly above electrical panelboards, switchboards, cabinets and similar electrical equipment. This is a violation of National Electrical Code (NEC) Article 110.26(E)(1) relative to dedicated equipment space. Any plumbing piping located above and within 6 feet of the top of electrical equipment shall be relocated at no additional cost to the Owner. Any piping more than 6 feet of the top of electrical equipment in this space shall be relocated by Division 22 at no additional cost to the Owner or other Divisions. Any plumbing piping more than 6 feet above electrical panelboards shall be panned with drain as directed by the Engineer.
- B. Install in accordance with manufacturer's instructions.
- C. Provide dielectric connections wherever jointing dissimilar metals.
- D. Make allowances for expansion and contraction.
- E. Cut pipe and tube ends square, ream before joining.
- F. Route piping in orderly manner to conserve building space and not interfere with use of space.
- G. Maintain pipe gradient, provide valve with capped hose adapter at low points of system.

- H. Group piping whenever possible at common elevations.
- I. Provide clearance for installation of insulation and access to valves and fittings.
- J. Use fittings for offsets and direction changes.
- K. Establish elevations of buried piping outside the building to ensure not less than cover specified. (3'-0" for drainage and gas piping, 5'-0" for water piping).
- L. Install valves with stems upright.
- M. Provide flashing and seal watertight all piping penetrations through weathered or waterproofed walls, floors and roofs.
- N. Provide fittings and adaptors as recommended by material manufacturer when connecting to existing piping systems or when connecting piping or dissimilar material. Rubber pipe clamps will not be an accepted method of connecting to piping. Verify proposed method of pipe connections with Engineer prior to installation.
- O. Paint all gas piping, both inside and outside building with two coats of urethane alkyd gloss enamel, color Safety Yellow in accordance with Section 09900 as directed by Owner's Representative. Manufactured by Benjamin Moore & Co., or accepted equal.

### 3.4 ERECTION TOLERANCES

- A. Establish invert elevations, slopes for drainage systems according to code requirements and elevations indicated. Maintain gradients.
- B. Slope water piping and arrange to drain at low points.

### 3.5 FIELD QUALITY CONTROL

- A. Obtain and pay for all required applications, permits and fees necessary to complete work.
- B. Clean, test, disinfect all new and disturbed, in accordance with Section 220593, CLEANING AND TESTING.
- C. Provide written test reports to the Engineer of all systems including the following:
  - 1. Type of test.
  - 2. Date, time, duration of test.
  - 3. Results of test.
  - 4. Signature of authority who witnessed test.

- D. After installation of domestic hot water recirculating piping systems and equipment, balance system, including existing or renovated systems. (If applicable balance entire system or systems to obtain proper circulation throughout the building).

END OF SECTION 221000



## SECTION 223000 – PLUMBING SPECIALTIES

### PART 1 – SUMMARY

#### 1.1 SUMMARY

- A. Floor drains, cleanouts.
- B. Drain valves.
- C. Fasteners.

#### 1.2 REFERENCES

- A. International Building Code, International Plumbing Code.
- B. ASME A12.21.2 Roof Drains, ASME A12.6.3, CSA B79, Floor Drains, ASME A12.36.2 Cleanouts.

#### 1.3 SUBMITTALS

- A. Product Data: Catalog sheets, specifications, dimensional data, rough in requirements, finishes and manufacturers installation instructions for each item specified.

#### 1.4 OPERATION AND MAINTENANCE

- A. Provide operation, maintenance and inspection data, replacement part numbers and service location and telephone number.
- B. Special tools: Deliver the following to the Owner's Representative and obtain receipt.
  - 1. Tools for vandal resistant fasteners: One for each type and size.
  - 2. T-handle wrench for cleanout plugs: One for each type and size.
  - 3. Wall hydrant T handle locking key for each hydrant and hose bibb.
  - 4. Torque wrench to fasten no-hub coupling clamps: Provide two (one standard, one with extension).
- C. Instruction:
  - 1. Provide start-up, operation and service instruction for all equipment installed with Owner's personnel responsible for the operation of equipment.

2. Provide documentation to the Architect after instruction of personnel has been completed. Include the following information:
  - a. Date, time and duration of instruction.
  - b. Name of equipment.
  - c. Signature of all personnel instructed.

## 1.5 QUALITY ASSURANCE

- A. All components manufactured for potable water use shall contain no more than a weighted average of 0.25 percent lead with respect to the wetted surfaces of piping, fittings, valves, pumps, accessories and meet the requirements of NSF/ANSI 372, third-party testing and certification.

## PART 2 – PRODUCTS

### 2.1 FLOOR DRAIN TYPE A

- A. Drain Body: Chemical and corrosion resistant, fire-retardant polypropylene material conforming to ASTM D-4101. Sediment basket, flashing flange and collar, 1/2" trap primer connection, plain end outlet.
- B. Strainer Head and Grate: Chemical and corrosion resistant, fire-retardant polypropylene material conforming to ASTM D-4101. 6" diameter industrial duty, adjustable height, vandal resistant fasteners.
- C. Acceptable Drain Series: Enfield F1000, Orion, Fuseal or accepted equal.

### 2.2 CLEANOUTS

- A. Manufacturers: Smith, Josam, Zurn or accepted equal.
- B. Cleanout Plug:
  1. Cast brass or bronze, with threaded end, and raised or countersunk head.
    - a. Tapped head for attachment of cleanout wall or deck plate covers where required.
  2. Anti-Seize Lubricant: Never-Seez by Bostik Chemical Group, Broadview, IL; Molycote 1000 by Dow Corning Corp., Midland, MI; Anti-Seize Lubricant by Loctite Corp., Newington, CT.

- C. Cleanout Wall Plate (WPCO): Round, stainless steel or polished chrome plated bronze cover plate with vandal resistant fastener to secure to cleanout plug. Equal to J R Smith #4452.

## 2.3 DRAIN VALVE

- A. Bronze two-piece body, 175 PSI WOG, chrome plated brass ball, Teflon seats and stuffing box ring, lever handle, 3/4" brass hose connection with cap and chain.

## 2.4 FASTENERS

- A. Corrosion resistant fasteners: Stainless steel, brass or bronze bolts are acceptable. Coated, plated or galvanized steel bolts are not acceptable.
- B. Vandal resistant fasteners: Allen or Spanner head bolts are acceptable. Philips or slotted fasteners are not acceptable.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Install the Work of this Section in accordance with the manufacturer's printed installation instructions, unless otherwise specified.
- B. Locate plumbing specials at locations and elevations indicated by Architectural drawings.

### 3.2 FLOOR DRAINS

- A. Protect weep holes from plugging during installation. Clean out weep holes after installation to remove obstructions.
- B. Set drainage flange flush with top of the structural floor slab, or at elevation otherwise indicated.
- C. After membrane waterproofing is installed and cured, secure the clamping ring.
- D. Adjust strainer head to height indicated. If height is not indicated, set at 1/2" below finished floor elevation.
- E. After floor installation and finish is completed, clean strainer grate and clean and paint cast iron floor drain bodies, sediment buckets and grate. Paint color to match floor where installed.

### 3.3 CLEANOUTS

- A. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
- B. Encase exterior cleanouts in concrete flush with grade. Size 12" x 12" x 4" thick.
- C. Provide brass carpet marker for cleanouts located in carpeted areas.
- D. Clean cover after floor installation and finish is completed.

### 3.4 DRAIN VALVE

- A. Install on water supply mains, at branch lines to fixtures or equipment, low points of system and were indicated or noted to facilitate system drainage.

END OF SECTION 223000

## SECTION 224000 – PLUMBING FIXTURES

### PART 1 – GENERAL

#### 1.1 SUMMARY

- A. Sinks.
- B. Trim for Sinks and Equipment not furnished by Division 22.

#### 1.2 REFERENCES

- A. ASME A112.18.1 - Finished and Rough Brass Plumbing Fixture Fittings.
- B. ADA Compliance Requirements

#### 1.3 SUBMITTALS

- A. Submit product data for Plumbing Fixtures and Trim.
- B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, finishes and manufacturer's installation instructions.
- C. Listed manufacturers and their series and/or model numbers do not imply unconditional specification approval. The series and/or model numbers listed may not be current, but are included as an acceptable series of products that must still comply with the written description and specification. Custom modifications may be required to make the series and/or model numbers listed comply with these written descriptions and specifications.

#### 1.4 QUALITY ASSURANCE

- A. Each fixture and fitting shall be plainly and permanently marked with the manufacturer's name or trade mark.
- B. Acid resistant surfaces shall be plainly and permanently marked with the manufacturer's label or symbol indicated acid resistance.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site.
- B. Accept fixtures on site in factory packaging. Inspect for damage.

- C. Protect fixtures from damage at all times including after installation.

## 1.6 PROJECT CONDITIONS

- A. Verify that field measurements are as instructed by the manufacturer.
- B. Confirm that casework is constructed with adequate provision for the installation of countertop sinks.

## 1.7 SPARE MATERIALS

- A. Special Tools: Furnish the following tools labeled with names and locations to be used. Turn tools over to Owner or Owners Representative and obtain receipt.
  - 1. Keys for stops (furnished with stops).
  - 2. Tools for Vandal Resistant Fasteners: Two for each type and size.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Plumbing Fixtures and trims shall be as manufactured by the listed manufacturers.
  - 1. Stainless Steel Fixtures: Just Manufacturing Company, Elkay Manufacturing Company, Superior Stainless-Steel Products, Inc., Mi-Fab, Acorn, Bradley, Karran, ICM/Teddy FSE, or accepted equal.
- B. Fixture Trim:
  - 1. Shall be supplied as a part of the fixture unless otherwise specified.
  - 2. Polished chrome plated brass.
  - 3. 17 gauge minimum for all drainage traps, tubing, etc.
  - 4. Listed by NYS DEC where applicable
  - 5. As manufactured by McGuire Manufacturing Company, Inc., Kohler Company, T&S Brass and Bronze Works, Inc., Chicago Faucet, Eljer Company, Crane Company, American Standard, Delta Faucet Company, Connecticut Stamping & Bending (CS&B).
- C. Listed manufacturers and their series and/or model numbers do not imply unconditional specification approval. The series and/or model numbers listed, are included as acceptable series of products that must still comply with the written description and specification. Custom modifications may be required to make the series and/or model numbers listed comply with these written descriptions and specifications.

## 2.2 MATERIALS – GENERAL

- A. Vitreous China: First quality, smooth, uniform color and texture and having a fused-on glaze covering on all surfaces exposed to view.
  - 1. Surfaces shall be free of chips, craze, warpage, cracks and discolorations. All surfaces in contact with walls or floors shall be flat, with warpage not to exceed 1/16 inch per foot.
  - 2. Color: White unless otherwise noted.
- B. Fixture Trim: Brass, bronze with chrome plating or stainless steel, to be supplied as a part of the fixture unless otherwise specified.
  - 1. Brass piping: IPS standard weight, with 125 lb. cast brass fittings.
  - 2. Brass tubing: 16 B&S gauge.
  - 3. Stainless steel: 18-8 type 302 or 304 unless otherwise specified.
- C. Trim Finishes (Exposed to View):
  - 1. Brass or bronze: Polished or satin finished chrome plating, 0.02 mil chromium over 0.2 mil nickel plating.
  - 2. Stainless steel: Invisible welds and seams, and unless otherwise specified, polished to No. 4 commercial finish.
- D. Fixture Hold-down Bolts: Steel, plated for corrosion resistance.
  - 1. Cap nuts: Metal, polished and chrome plated.
- E. Combination Faucets: Faucets shall turn counter to each other for the on and off positions.
- F. Vandal Resistant Construction: Secure removable components in place with vandal resistant fasteners or devices which cannot be removed without the use of special tools.
  - 1. Vandal Resistant Fasteners: Allen or spanner head bolts are acceptable; other types will be considered if submitted. Phillips head and slotted head fasteners are not acceptable.

## 2.3 TRIM FOR FIXTURES AND EQUIPMENT NOT PROVIDED BY DIVISION 22.

- A. Provide rough-in and final connection to fixtures and equipment indicated on Drawings and as specified herein.
- B. Prior to rough-in, obtain manufacturers installation manuals from the Division supplying the fixtures and equipment.
- C. Coordinate all work with Architectural Drawings and with the Division supplying the fixtures and equipment.

D. Lab Sink:

1. Sink, faucet and strainer drain will be furnished by the Owner. Provide rough-in, install sink and make final connections to make operational, including:
  - a. Installation of faucet and strainer drain on sink.
  - b. ½" IPS x 3/8" O.D. chrome plated brass wall supplies with loose key stops, flexible braided stainless steel supply risers and chrome plated cast brass set screw escutcheon.
  - c. 17-gauge chrome plated brass 1½" x 1½" adjustable P-trap with bottom cleanout plug and chrome plated cast brass set screw escutcheon.
2. Obtain manufacturers catalog sheets with rough-in and installation requirements from Owner prior to starting work.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.

3.2 PREPARATION

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install each fixture with trap, easily removable for servicing and cleaning.
- C. Provide chrome plated rigid or flexible supplies to fixtures with loose key and screwdriver stops, reducers, and set screw escutcheons.
- D. Install components level and plumb.
- E. Install and secure fixtures in place with wall supports, wall carriers and bolts.
- F. Seal fixtures to wall and floor surfaces with a white sealant of a type intended for this purpose.
- G. Provide all fixtures to be vandal resistant.



### 3.4 INTERFACE WITH OTHER PRODUCTS

- A. Review all shop drawings related to fixture installation. Confirm location and size of fixtures and openings before rough-in and installation.

### 3.5 ADJUSTING

- A. Adjust Work and leave all fixtures operating properly.
- B. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

### 3.6 CLEANING

- A. Clean all Work at completion of the project.
- B. At completion, clean plumbing fixtures and equipment.

### 3.7 PROTECTION OF FINISHED WORK

- A. Protect finished Work to prevent damage.
- B. Do not permit use of fixtures.

### 3.8 FIXTURE HEIGHTS

- A. Install fixtures to heights above finished floor as indicated on Fixture Mounting Height Schedule shown on Architectural Drawings or as directed by Architects.

### 3.9 FIXTURE ROUGH-IN SCHEDULE

A. Schedule:

	(Minimum Sizes)			
	Hot Water	Cold Water	Waste	Vent
Sink:	½ inch	½ inch	1½ inch	1½ inch
Notes:				
1. Headers for gang fixtures to be full size entire length. Provide shock absorbers as required.				

END OF SECTION 224000

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Emergency eye/face washes.
2. Emergency combination showers with eye/face washes.
3. Supplemental equipment.
4. Water-tempering equipment.

### 1.2 DEFINITIONS

- A. Barrier-Free Fixture: Emergency plumbing fixture that can be approached, entered, and used by people with disabilities.
- B. Plumbed Emergency Plumbing Fixture: Fixture with fixed, potable-water supply.
- C. Portable, Self-Contained Emergency Plumbing Fixture: Fixture with flushing-fluid supply.
- D. Tepid: Between 60 and 100 deg F.

### 1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include flow rates and capacities, furnished specialties, and accessories.

B. Shop Drawings:

1. Plans, elevations, sections, and attachment details.
2. Details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Diagrams for power, signal, and control wiring.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.
- B. Emergency fixture third-party certification documentation.

## 1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For emergency plumbing fixtures.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Plumbing fixtures intended to convey or dispense water for human consumption are to comply with the U.S. Safe Drinking Water Act, with requirements of authorities having jurisdiction, and with NSF 61 and NSF 372, or be certified in compliance with NSF 61 and NSF 372 by an ANSI-accredited third-party certification body, in that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.
- B. Comply with requirements in ICC A117.1 for installation of barrier-free emergency fixtures.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

### 2.2 EMERGENCY EYE/FACE WASHES

- A. Emergency Eye/Face Wash - Deck Mounted, Plumbed:
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide WaterSaver Faucet Co.; Emergency Shower, Semi-Concealed, Stainless Steel Shower Head and Pipe EW1022 or comparable product by one of the following:
    - a. Guardian Equipment Co
    - b. Haws Co.
  - 2. Source Limitations: Obtain emergency eye/face washes, deck mounted, plumbed, from single manufacturer.
  - 3. Standards:
    - a. ANSI/ISEA Z358.1.
    - b. ASME A112.18.1/CSA B125.1.
    - c. ASME A112.18.2/CSA B125.2.
  - 4. Capacity: Not less than 3 gpm for at least 15 minutes.
  - 5. Supply Connection Size: NPS 1/2.
  - 6. Integral Supply Pipe Material: Chrome-plated brass.
  - 7. Control Valve:
    - a. Type: Stay-open type valve with flow regulator.
    - b. Actuator: Paddle.

8. Spray-Head Assembly: Two or four spray heads.
9. Receptor: Stainless steel bowl.
10. Drain Piping:
  - a. Size: NPS 1-1/4 minimum.
  - b. Fittings: Receptor drain, P-trap, waste to wall, and wall flange.
11. Mounting: Deck.
12. Accessories:
  - a. Electric alarm with flashing light and horn.
  - b. Thermostatic mixing valve assembly including ball valve shutoffs and outlet temperature gauge. ASSE 1071 compliant.
  - c. Flow switch; single pole.
  - d. Dust covers.
  - e. Magnetically actuated proximity switch.
  - f. Scald protection valve.
  - g. Manufacturer recommended stainless steel ball valve.
  - h. Flexible stainless steel hose in place of PVC hose..
  - i. Undercounter hose guide bracket to prevent hose from tangling or binding.

## 2.3 EMERGENCY COMBINATION SHOWERS WITH EYE/FACE WASHES

### A. Emergency Combination Shower with Eye/Face Wash, Barrier Free, Plumbed:

1. Basis-of-Design Product: Subject to compliance with requirements, provide WaterSaver Faucet Co.; Barrier-Free Safety Station with WideArea™ Eye/Face Wash, Plastic Shower Head SSF909 or comparable product by one of the following:
  - a. Guardian Equipment Co
  - b. Haws Corporation
2. Source Limitations: Obtain emergency combination showers with eye/face washes, barrier free, plumbed, from single manufacturer.
3. Standards:
  - a. ANSI/ISEA Z358.1.
  - b. ASME A112.18.1/CSA B125.1.
  - c. ASME A112.18.2/CSA B125.2.
4. Integral Supply/Drain Pipe:
  - a. Material: Galvanized steel.
  - b. Supply Connection Size: NPS 1-1/4 minimum.
  - c. Drain Connection Size: Outlet at back or side near bottom. NPS 1-1/4 minimum.

5. Shower:
  - a. Capacity: Not less than 20 gpm for at least 15 minutes.
  - b. Supply Piping: NPS 1 with flow regulator and stay-open control valve.
  - c. Control Valve:
    - 1) Type: Stay-open type with flow regulator.
    - 2) Actuator: Pull rod.
  - d. Shower Head: 10-inch-minimum diameter, plastic.
  - e. Mounting: Pedestal.
6. Eye/Face Wash:
  - a. Capacity: Not less than 3.0 gpm for at least 15 minutes.
  - b. Supply Piping: NPS 1/2 with flow regulator and stay-open control valve.
  - c. Control Valve:
    - 1) Type: Stay-open type with flow regulator.
    - 2) Actuator: Paddle.
  - d. Spray-Head Assembly: Two or four receptor-mounted spray heads.
  - e. Receptor: Stainless steel bowl.
  - f. Mounting: Attached to shower pedestal.
7. Accessories:
  - a. Thermostatic mixing valve assembly including ball valve shutoffs and outlet temperature gauge. ASSE 1071 compliant.
  - b. 1-inch stainless steel ball valve.
  - c. Powder coated finish on galvanized pipe and fittings.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine roughing-in for water and waste piping systems to verify actual locations of piping connections before plumbed emergency plumbing fixture installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION OF EMERGENCY PLUMBING FIXTURES

- A. Assemble emergency plumbing fixture piping, fittings, control valves, and other components.
- B. Install fixtures level and plumb.

- C. Fasten fixtures to substrate.
- D. Install shutoff valves in water-supply piping to fixtures, to facilitate maintenance of fixture. Use ball or gate valve if specific type valve is not indicated. Install valves chained or locked in open position if permitted. Install valves in locations where they can easily be reached for operation. Comply with requirements for valves specified in Section 220523 "General-Duty Valves for Plumbing Piping."
- E. Install dielectric fitting in supply piping to emergency fixture if piping and fixture connections are made of different metals. Comply with requirements for dielectric fittings specified in Section 221116 "Domestic Water Piping."
- F. Install thermometers in supply and outlet piping connections to water-tempering equipment. Comply with requirements for thermometers specified in Section 220500 "Common Work Results for Plumbing."
- G. Install trap and waste piping on drain outlet of emergency fixture receptors that are indicated to be directly connected to drainage system. Comply with requirements for waste piping specified in Section 221316 "Sanitary Waste and Vent Piping."
- H. Install indirect waste piping on drain outlet of emergency fixture receptors that are indicated to be indirectly connected to drainage system. Comply with requirements for waste piping specified in Section 221316 "Sanitary Waste and Vent Piping."
- I. Install escutcheons on piping wall and ceiling penetrations in exposed, finished locations. Comply with requirements for escutcheons specified in Section 220500 "Common Work Results for Plumbing."

### 3.3 PIPING CONNECTIONS

- A. Connect cold-water-supply piping to plumbed emergency plumbing fixtures not having water-tempering equipment. Comply with requirements for cold-water piping specified in Section 221116 "Domestic Water Piping."
- B. Connect hot- and cold-water-supply piping to hot- and cold-water, water-tempering equipment. Connect output from water-tempering equipment to emergency plumbing fixtures. Comply with requirements for hot- and cold-water piping specified in Section 221116 "Domestic Water Piping."
- C. Directly connect emergency plumbing fixture receptors with trapped drain outlet to sanitary waste and vent piping. Comply with requirements for waste piping specified in Section 221316 "Sanitary Waste and Vent Piping." Indirectly connect emergency plumbing fixture receptors without trapped drain outlet to sanitary waste piping.
- D. Where installing piping adjacent to emergency plumbing fixtures, allow space for service and maintenance of fixtures.

### 3.4 IDENTIFICATION

- A. Install equipment nameplates or equipment markers on emergency plumbing fixtures and equipment and equipment signs on water-tempering equipment. Comply with requirements for identification materials specified in Section 220553 "Identification for Plumbing Piping and Equipment."

### 3.5 FIELD QUALITY CONTROL

- A. Mechanical-Component Testing: After plumbing connections have been made, test for compliance with requirements. Verify ability to achieve indicated capacities.
- B. Tests and Inspections:
  - 1. Perform each visual and mechanical inspection.
  - 2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
  - 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation.
  - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
  - 5. Emergency plumbing fixtures and water-tempering equipment will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

### 3.6 ADJUSTING

- A. Operate and adjust emergency plumbing fixtures and controls. Replace damaged and malfunctioning fixtures and controls.
- B. Adjust or replace fixture flow regulators for proper flow.
- C. Adjust equipment temperature settings.

### 3.7 CLEANING AND PROTECTION

- A. Clean emergency plumbing fixtures with manufacturers' recommended cleaning methods and materials.
- B. Install protective covering for installed emergency plumbing fixtures and fittings.
- C. Do not allow use of emergency plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 224500



## SECTION 230000 – GENERAL REQUIREMENTS FOR DIVISION 23

### PART 1 - GENERAL

#### 1.1 BID AND CONTRACT DOCUMENTS

- A. All Work in this Division is subject to the provisions of the General Conditions, Supplementary General Conditions and Requirements of Division 1 General requirements.
- B. By submitting the bid, the Contractor acknowledges that he has not received any verbal directives from the Owner, Architects and Engineers (and their employees and sub-consultants) at any time before, during or after the bid. He further acknowledges that he has verified with all his sub-contractors, suppliers, vendors, and their representatives that they have not received any verbal directives from the Owner, Architects and Engineers (and their employees and sub-consultants) at any time before, during or after the bid. The Contractor further acknowledges that all changes to the bid documents have been only in the form of formal addendum.
- C. By starting Work on this project, the Contractor acknowledges that all directives, field orders and change order will be only from the Owner or his Owner's Representative and only in writing. All other directives verbal or otherwise will be at the Contractor's own risk.

#### 1.2 SCOPE OF WORK

- A. The scope of this Work includes heating, ventilating and air conditioning systems for the project as indicated on the Contract Documents, including, but not limited to the following:
  - 1. Removal of existing HVAC equipment, piping and ductwork as indicated on Drawings.
  - 2. Variable volume air distribution system, including VAV boxes and associated ductwork, ductwork accessories, registers, grilles and controls.
  - 3. Ventilation systems including ductwork, ductwork accessories, registers, grilles, etc.
  - 4. Duct insulation.
  - 5. Control wiring to motor controllers, VAV control transformers, etc.
  - 6. Extension of existing temperature control system.
  - 7. Adjusting and balancing.
  - 8. All necessary cutting, patching and firestopping
  - 9. Miscellaneous items shown and/or specified.

### 1.3 PERMITS AND INSPECTIONS

- A. Permits: Division 23 shall acquire all required permits required for execution of the Work of this Division and shall pay all fees and charges for same.

### 1.4 CODES AND STANDARDS

- A. Building Code of New York State: Provide all Work in compliance with and meet the requirements of the code.
- B. Standards: All equipment shall meet all the requirements of ANSI, NEMA, ASHRAE, and SMACNA standards.
- C. Listing: All equipment and devices for which Underwriters Laboratories has a listing service, shall be UL listed and bear the UL listing label.
- D. All materials and installation shall comply with:
  - 1. Building Code of New York State.
  - 2. Energy Conservation Code of New York State.
  - 3. Fire Code of New York State.
  - 4. Mechanical Code of New York State.
  - 5. Fuel Gas Code of New York State.
  - 6. National Fire Protection Association (NFPA)
  - 7. New York State Department of Labor Rules and Regulations.
  - 8. New York Board of Fire Underwriters.
  - 9. Americans with Disabilities Act.
  - 10. Local Utilities.
  - 11. Authorities Having Jurisdiction.
  - 12. Federal & State Occupational Safety and Health Administration.
  - 13. Local Municipality Codes and Ordinances.
- E. In case of conflict between the Contract Documents and the requirements of any Code or Authorities Having Jurisdiction, the most stringent requirements of the aforementioned shall govern.
- F. Should this Division perform any Work that does not comply with the requirements of the applicable Building Codes, State Laws, Local Ordinances, Industry Standards Power Company regulations, he shall bear all costs arising in correcting the deficiencies, as approved by the Architect/Owner.

## 1.5 LOCAL AUTHORITY HAVING JURISDICTION (AHJ)

This Document does not supersede any Code, local or otherwise. All Contractors must be aware of any local requirements and Codes that may affect this project. The AHJ will make all final decisions concerning all code interpretations. Any discrepancies must be reported to the Architect or Engineer within 24 hours. Any code violations are the responsibility of the Contractor and the Contractor shall promptly make all required corrections.

## 1.6 SUBMITTALS

- A. Submit Shop Drawings on all items of equipment and materials to be furnished and installed as required, arranged by specification section number. Include review stamp and table of contents/bill of materials. Do not combine materials from different specification sections.
- B. If submitting electronically, in addition to the requirements above, provide one (1) single-sided color hard copy of every submittal required directly to the Engineer. This includes submittal drawings that are larger than 11" x 17". Reduced scale photocopies will not be acceptable. Failure to abide by these requirements will result in an immediate ACTION C – REVISE AND RESUBMIT without review. All individual items and options within the submittal shall be clearly highlighted or otherwise identified.
- C. Operation and maintenance manuals and record drawings shall not be submitted electronically. Provide hard copies only; one (1) copy shall be sufficient.
- D. Listed manufacturers and their series and/or model numbers do not imply unconditional specification approval. The series and/or model numbers listed may not be current or correct, but are included as an acceptable series of products that must still comply with the written description and specification. Provision of products, based solely on model numbers listed in the specifications does not constitute automatic acceptance. Approved submittals of all product data are still required.

## 1.7 QUALITY ASSURANCE

- A. Install all Work true to line and grade, parallel and close to walls and parallel to lines of building and maintaining maximum headroom. Do not install ductwork, piping, equipment, etc. across doors, windows or other openings.
- B. All equipment shall be accessible for operation, service, etc.
- C. All equipment and material shall be new, unused and without any defects.

1.8 PROTECTION OF PERSONS AND PROPERTY

- A. Make provisions to prevent moisture and foreign matter from entering piping, equipment, etc.
- B. Contractor shall be responsible for all damages until Work is fully accepted. Replace all damaged equipment and material.
- C. Assume responsibility for construction safety at all times. Include, as part of Contract, all trench or building shoring, scaffolding, shield, dust protection, mechanical/electrical protection, safety railings, barriers and other safety features required to provide safety conditions for all Workmen and site visitors.

1.9 EXAMINATION OF SITE

- A. Examine all Drawings including other Divisions
- B. Examine all existing conditions and ascertain access to site, available storage and delivery facilities.
- C. Verify all governing dimensions at site and building.

1.10 OBSTACLES, INTERFERENCE AND COOPERATION

- A. Drawings show general design and arrangement. Verify exact location and elevations at the job location. Do not scale plans and diagrams.
- B. Drawings do not show all offsets, fittings, interferences and elevation changes. Adjust installation of piping, ductwork, equipment location, etc. to accommodate Work with the obstacles and interferences. Where rearrangement is necessary, report same to Architect for review. Obtain written acceptance for all changes.
- C. Cooperate with all Contractors and Owner and determine the exact route of all piping, ductwork, raceway and location of all equipment.

1.11 CONCEALMENT

- A. Unless otherwise specifically indicated, all Work shall be concealed above ceiling space, in wall space and elsewhere throughout the building.
- B. In areas with no ceilings, install only after Architect reviews and comments on arrangement and appearance.

#### 1.12 COORDINATION

- A. Review all construction Drawings and coordinate all Shop Drawings with Work specified under all divisions of the specifications. Division 23 is responsible to coordinate and cooperate with other Divisions' Work so that Work can be installed and maintained substantially as called for.
- B. Under no circumstances shall this Division route any piping or other equipment foreign to the electrical installation in the dedicated equipment space located directly above both new and existing electrical panelboards and electrical equipment, which is a violation of the National Electrical Code (NEC) Article 110.26(E)(1). Failure to adhere to this Requirement will necessitate removal and relocation or rerouting of said piping by this Division at no additional cost to the Owner or other trades

#### 1.13 OPENINGS, SLEEVES AND CHASES

- A. Certain chases, openings and shafts will be provided as shown as part of General Construction Plans and Specifications.
- B. Provide all other openings and sleeves for ductwork, pipe, etc. through floors, walls, partitions, ceilings, roofs, etc. for Division 23 Work.
- C. Assume responsibility for correct and final location and size of such openings: furnish templates if required. Correct improperly located and sized or omitted chases and openings as required. Plug all abandoned sleeves left as part of this Division.

#### 1.14 FLASHING, SEALING AND FIRESTOPPING

- A. Seal where piping or ductwork passes through or is affixed to general construction.
- B. Provide flashing, sealing and waterproofing for wall, floor and roof openings without affecting roof guarantee or bond.
- C. Piping entering through waterproof walls, floors and partitions: Provide Thunderline Corporation "Link-Seal" or accepted substitute for sealing the annular space between the piping and sleeves.
- D. Provide firestopping for openings through fire and smoke barriers, maintaining minimum required rating of floor, ceiling or wall assembly. Refer to Section 230510.

#### 1.15 CUTTING AND PATCHING

- A. Contractor shall do all cutting and patching of existing surface required for installation of Work installed under this Contract.
- B. Repaired surfaces shall match existing surface.

- C. Method of cutting shall be approved by the Architect.

#### 1.16 PAINTING

- A. Prepare surfaces of Work installed under this Division by cleaning, removing rust, etc.
- B. Paint all exposed Work in existing areas to match existing conditions.

#### 1.17 ACCESS PANELS

- A. Provide for all valves and equipment located in concealed spaces.
- B. Access panels shall be UL rated for walls and/or ceilings they are installed in.
- C. Provided complete by General Construction Division at locations required for repair or maintenance and as required by Code. Quantity, location and size shall be the responsibility of this Division. Coordinate location with General Construction Division.

#### 1.18 STORAGE AND PROTECTION OF MATERIALS

- A. Store materials on base, minimum 6" above ground or floor. Equip with waterproof or windproof cover for items subject to moisture damage.
- B. Store in orderly manner so as not to interfere with other Work or obstruct access to buildings or facilities.
- C. Replace items stolen or damaged at no cost to the Owner.

#### 1.19 EQUIPMENT CONNECTIONS

- A. Provide complete piping connections to all equipment as called for on Drawings and as specified.
- B. Obtain approved roughing diagrams and exact location of equipment for items furnished under other Divisions of the specifications. Do not rough in without approved Drawing.

#### 1.20 CONTINUITY OF SERVICE

- A. Building will be used by Owner during the construction period.
- B. Keep all systems operative; make temporary connections as required.

- C. Do not shut off any service without written permission from the Owner or Owner's Representative. Schedule systems shutdown with notify the Owner, in writing, at least one (1) week prior to testing. Provide date and time of testing.

#### 1.21 TESTS

- A. Perform operations required for the complete testing of all systems, equipment and related Work as called for.
- B. Perform all tests required by local municipalities, utilities, or other governing bodies, boards or agencies having jurisdiction.

#### 1.22 OWNER INSTRUCTIONS

- A. Instruct designated Owner's personnel on the proper operation and care of systems and equipment, before final acceptance of the Work. Obtain written acknowledgement from person instructed prior to final payment. Submit to Architect with final acceptance request.
- B. Provide required training of Owner's personnel as called for in the Division 23 technical specifications and Division 1 Commissioning Requirements.

#### 1.23 CONTRACTOR'S CERTIFICATION

- A. All submittals shall bear the Contractor's stamp, certifying the review and approval of submittal, verification of field measurements and compliance with Contract Documents. It shall specifically be as follows:

Contractor acknowledges that all items submitted herein are provided for the base Contract Cost; and that he has reviewed the submittal information contained herein; and that he has determined and verified the materials, field measurements and field construction criteria related thereto, and that he has checked and coordinated the information contained in the submittal with the requirements of all Work in the Contract Documents and other Contracts in the Project.

\_\_\_\_\_  
Contractor's Signature

\_\_\_\_\_  
Date

- B. All submittals without the above certification will be returned, rejected.

END OF SECTION 230000

## SECTION 230509 – GENERAL WIRING FOR EQUIPMENT INCLUDED IN DIVISION 23

### PART 1 – GENERAL

#### 1.1 SUMMARY

- A. Provide all necessary electrical control wiring for all motors, motor controllers and equipment included under this Division unless otherwise noted. Power wiring shall be by Division 26, unless otherwise specified.
- B. Provide indicating devices, interface equipment, control transformers, starter coils, relays, contactors, and all related wiring, conduit and other apparatus required to operate and control each mechanical system and to perform the functions specified.
- C. Provide all materials and field work necessary to connect control components factory supplied as part of the equipment controlled, unless specified otherwise.

#### 1.2 SUBMITTALS

- A. Division 23 shall deliver two copies of accepted wiring diagrams required for wiring connections to the Division 26 Contractor.

### PART 2 - PRODUCTS

#### 2.1 WIRES AND CABLES

- A. Provide wire and cable suitable for the temperature, conditions and location where installed.
- B. Use single conductor insulated wire, minimum size at No. 12 AWG.
- C. Conductor Material: Annealed copper, 98% conductivity, for all wires and cables. Provide stranded conductors for power and control circuits of all sizes. Aluminum conductors are prohibited.
- D. Insulation: Unless otherwise required, provide THHN/THWN insulation for all locations where installed. Insulation voltage rating shall be 600 volts.
- E. All conductors installed indoors shall conform to the Building Code of New York State requirements for combustion toxicity tests.



F. Color coding for phase identification shall be in accordance with the following table:

<u>Phase</u>	<u>Three Phase 120/208 Volt</u>	<u>Three Phase 277/480 Volt</u>
Ground	Green	Green
Neutral	White	Gray
A or L1	Black	Brown
B or L2	Red	Orange
C or L3	Blue	Yellow

## 2.2 RACEWAYS

- A. Rigid Steel Conduit: Galvanized on the outside and enameled on the inside or hot dipped on the outside and inside.
- B. Steel Electrical Metallic Tubing: Electro-galvanized on the outside and enameled on the inside.
- C. Flexible Steel Conduit: Hot dipped galvanized steel strip shaped into interlocking convolutions.
- D. Liquidtight Flexible Metal Conduit: Heavy galvanized steel core, of interlocked construction with oil resistant thermoplastic cover.
- E. Minimum  $\frac{3}{4}$ " size conduit shall be provided.

## 2.3 MISCELLANEOUS HARDWARE

- A. Provide miscellaneous bolts, nuts, washers, anchor bolts, inserts, fittings, rods etc. for complete and operational installation.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Before installing any Work, layout the proposed course for the conduits and have same accepted.

### 3.2 EXAMINATION

- A. This Division shall be responsible for verifying voltages, phase, horsepower/kW sizes, lug sizes and wiring sizes with the Division 26 contractor. Any changes in the equipment and wiring between the design make and the unit furnished shall borne by this Division at no increased cost in the Contract.

### 3.3 INSTALLATION OF WIRING

- A. For any electrical wiring performed by this Division, obtain an inspection and certificate from the New York Board of Fire Underwriters and submit it prior to application for final payment.
- B. Install all Work in accordance with the manufacturer's instructions and per the National Electrical Code. Comply with all applicable sections of Division 26.
- C. Control Wiring: This Division shall provide all control wiring. Control wiring includes, but is not limited to, wiring to wiring between control panels or equipment, wiring to control transformers, etc.
- D. All wiring shall be installed in approved raceway system. Provide 115 volts AC (+10%) to each Energy Management System (EMS) Controller from the nearest normal power branch circuit panelboard. Where equipment to be controlled is on stand-by (generator) power, provide 115 volts AC (+10%) to each Energy Management System (EMS) Controller serving such equipment from the nearest stand-by power branch circuit panelboard. Clearly indicate circuit breaker used. Provide replacement circuit breaker if no spare is available. Provide a minimum #12 AWG green ground wire for each circuit. Power to all EMS control components (ie: damper motors, valve actuators, control transformers, etc.) shall be by Division 23. Update panelboard directories.

### 3.4 RACEWAY SCHEDULE

- A. Rigid Steel Conduit: Install in all locations indicated on the Drawings, including:
  - 1. Conduit stub-ups.
  - 2. In outdoor, above grade locations.
  - 3. All areas subject to mechanical damage or wet and damp locations.
  - 4. In hazardous locations.

B. Steel Electrical Metallic Tubing:

1. May be installed concealed as branch circuit conduits in hollow areas in dry locations, including:
  - a. Hollow concrete masonry units, except where cores are to be filled.
  - b. Drywall construction with sheet metal studs, except where studs are less than 3½" deep.
2. May be installed exposed in dry locations, in Mechanical and Electrical Rooms only.

C. Flexible Metal Conduit:

1. Use 1-3 feet of flexible steel conduit for final conduit connection to:
  - a. Motors with open, drip-proof or splash-proof housings.
  - b. Equipment subject to vibration (dry locations).
  - c. Equipment requiring flexible connection for adjustment or alignment (dry locations).
  - d. Recessed lighting fixtures in suspended ceilings.
2. Install equipment grounding conductor in all flexible metal conduit and bond at each box or equipment to which conduit is connected.

D. Liquidtight Flexible Metal Conduit:

1. Use 1-3 feet of Liquidtight flexible metal conduit for final conduit connect to
  - a. Motors with weather-protected or totally enclosed housings.
  - b. Equipment subject to vibration and in damp or wet locations.
  - c. Equipment requiring flexible connection for adjustment or alignment in damp or wet locations.
2. Install equipment grounding conductor in all Liquidtight flexible metal conduit and bond at each box or equipment to which conduit is connected.

END OF SECTION 230509

## SECTION 230513 – MOTORS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Single phase premium efficiency electric motors.
- B. Three phase premium efficiency electric motors.

#### 1.2 REFERENCES

- A. AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
- B. AFBMA 11 - Load Ratings and Fatigue Life for Roller Bearings.
- C. ANSI/IEEE 112 - Test Procedure for Polyphase Induction Motors and Generators.
- D. ANSI/NEMA MG 1 - Motors and Generators.
- E. ANSI/NFPA 70 - National Electrical Code.
- F. Energy Conservation Construction Code of New York State.

#### 1.3 SUBMITTALS

- A. Submit motor efficiency data for each motor over ½ horsepower.
- B. Submit operation and maintenance data, including assembly drawings and bearing data with replacement sizes, and lubrication instructions.

#### 1.4 QUALITY ASSURANCE

- A. Motor efficiencies shall comply with the International Energy Conservation Code requirements or as specified (the more stringent shall apply).
- B. All motors over ½ horsepower to be premium high efficiency and inverter duty for VFD service where required.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Lincoln.
- B. Baldor.
- C. General Electric.
- D. Or accepted equal.

### 2.2 GENERAL CONSTRUCTION AND REQUIREMENTS

- A. Electrical Service: Refer to Division 26 Drawings and Specifications for required electrical characteristics.
- B. Motors: Design for continuous operation in 40°C environment, and for temperature rise in accordance with ANSI/NEMA MG 1 limits for insulation class, Service Factor, and motor enclosure type.
- C. Nameplate: Equip with 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 and efficiency.
- D. Electrical Connection: Equip with conduit connection boxes, threaded for conduit. For fractional horsepower motors where connection is made directly, provide conduit connection in end frame.
- E. All motors ½ HP and larger shall be premium efficiency type.

#### 1. Motor Efficiencies (based upon 1,800 RPM):

<u>Horsepower</u>	<u>Open Drip-Proof Minimum Efficiency</u>	<u>Totally Enclosed Minimum Efficiency</u>
0.5	85.5	85.5
1.0	85.5	85.5
1.5	86.5	86.5
2.0	86.5	86.5
3.0	89.5	89.5
5.0	89.5	89.5
7.5	91.0	91.7
10.0	91.7	91.7

#### 2. For other RPM's, motor efficiencies shall first be approved by Engineer.

## 2.3 SINGLE PHASE POWER - SPLIT PHASE MOTORS

- A. Starting Torque: Less than 150% of full load torque.
- B. Starting Current: Up to seven (7) times full load current.
- C. Breakdown Torque: Approximately 200% of full load torque.
- D. Drip-proof Enclosure: Class A (50°C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve or ball bearings.

## 2.4 SINGLE PHASE POWER - PERMANENT-SPLIT CAPACITOR MOTORS

- A. Starting Torque: Exceeding  $\frac{1}{4}$  of full load torque.
- B. Starting Current: Up to six (6) times full load current.
- C. Multiple Speed: Through tapped windings.
- D. Open Drip-proof or Enclosed Air Over Enclosure: Class A (50°C temperature rise) insulation, minimum 1.0 Service Factor, prelubricated sleeve or ball bearings, automatic reset overload protector.

## 2.5 THREE PHASE POWER - SQUIRREL CAGE MOTORS

- A. Starting Torque: Between 1 and  $1\frac{1}{2}$  times full load torque.
- B. Starting Current: Six (6) times full load current.
- C. Power Output, Locked Rotor Torque, Breakdown or Pullout Torque: NEMA Design B characteristics.
- D. Design, Construction, Testing, and Performance: Conform to ANSI/NEMA MG 1 for Design B motors.
- E. Insulation System: NEMA Class B or better.
- F. Testing Procedure: In accordance with ANSI/IEEE 112, Test Method B. Load test motors to determine freedom from electrical or mechanical defects and 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 imbedded in motor windings and epoxy encapsulated solid state control relay for wiring into motor starter; refer to Section 262913, MOTOR CONTROLLERS.

- I. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum AFBMA 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 ANSI/NEMA MG 1.
- K. Weatherproof Epoxy Sealed Motors (Where Indicated): Epoxy seal windings using vacuum and pressure with rotor and starter surfaces protected with epoxy enamel. Bearings shall be double shielded with waterproof non-washing grease.
- L. Nominal Efficiency: Meet or exceed values specified at full load and rated voltage when tested in accordance with ANSI/IEEE 112.
- M. Nominal Power Factor: Meet or exceed values specified at full load and rated voltage when tested in accordance with ANSI/IEEE 112.

## 2.6 VARIABLE SPEED MOTORS

- A. Motors  $\frac{1}{2}$  horsepower and larger specified as variable speed motors shall be premium efficiency type suitable for inverter duty service.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. This division shall be responsible for verifying voltages, phase and horsepower/kW sizes, with the Division 26 contractor. Any changes in the equipment between the design make and the unit furnished shall be borne by this Division at no increased cost to the Contract.

### 3.2 APPLICATION

- A. Motors drawing less than 250 watts and intended for intermittent service may be germane to equipment manufacturer and need not conform to these specifications.
- B. Motors shall be open drip-proof type, except where specifically noted otherwise.
- C. Single phase motors for fans, blowers, pumps shall be capacitor start, capacitor run type.
- D. Motors located outdoors, indoors and in wet or high humidity locations, in unfiltered air streams, or as specified, shall be totally enclosed type.

E. NEMA OPEN MOTOR SERVICE FACTORS

HP	3600 RPM	1800 RPM	1200 RPM	900 RPM
1/6-1/3	1.35	1.35	1.35	1.35
1/2	1.25	1.25	1.25	1.15
3/4	1.25	1.25	1.15	1.15
1	1.25	1.15	1.15	1.15
1 1/2 – 75	1.15	1.15	1.15	1.15

END OF SECTION 230513



## SECTION 230529 – SUPPORTS AND ANCHORS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Duct and equipment hangers, supports, inserts and associated anchors.
- B. Equipment bases and supports.
- C. Sleeves and seals.

#### 1.2 PRODUCTS FURNISHED, BUT NOT INSTALLED UNDER THIS SECTION

- A. Roof curbs.

#### 1.3 SUBMITTALS

- A. Submit Product Data and indicate hanger and support framing and attachment methods.

### PART 2 - PRODUCTS

#### 2.1 MISCELLANEOUS HANGERS AND SUPPORTS

- A. Beam Clamps:
  - 1. Material: Malleable Iron.
  - 2. Service: Recommended for use on American Standard I-beams and wide flange beams.
  - 3. UL listed/FM approved.
  - 4. Manufacturer and Model:
    - a. C-Clamp: Grinnell Fig. 86 or accepted equal.
    - b. Center Beam Clamp: Grinnell Fig. 217 or accepted equal.
    - c. Side Beam Clamp: Grinnell Fig. 225 or accepted equal.

#### 2.2 HANGER RODS

- A. Steel Hanger Rods: Cadmium plated threaded both ends, threaded one end, or continuous threaded.

## 2.3 CONCRETE FASTENERS

- A. Steel shell and expander plug for threaded connection; size fasteners to suit threaded hanger rods.
- B. Manufacturer: Phillips (Design Make), Rawl Plug, or accepted equal.
- C. See details No. 14 and No. 16 on Drawing H202.

## 2.4 FLASHING

- A. Metal Flashing: 26 ga. galvanized steel
- B. Lead Flashing: Five lb./sq. ft. sheet lead for waterproofing; by General Contractor.
- C. Flexible Flashing: 47 mil thick butyl, compatible with roofing.
- D. Caps: Steel, 22 ga. minimum; 16 ga. at fire resistant elements.

## 2.5 EQUIPMENT CURBS, BASES AND SUPPORTS

- A. Provide curbs for roof mounted equipment. Curbs shall be furnished by the unit manufacturer or be prefabricated. All curbs shall be minimum 16" high and insulated except for curbs for air intakes, which shall be a minimum of 24" high. Manufacturer: Pate (Design Make), or accepted equal.
- B. Provide supports fabricated from steel channel, angle, and/or pipe as shown or specified.

## 2.6 SLEEVES

- A. Sleeves for Round Ductwork: Form with galvanized steel.
- B. Sleeves for Rectangular Ductwork: Form with galvanized steel.

## 2.7 FABRICATION

- A. Size sleeves large enough to allow for movement due to expansion and contraction.

## 2.8 FINISH

- A. Cadmium plated steel hangers and supports.

## PART 3 - EXECUTION

### 3.1 EQUIPMENT CURBS, BASES AND SUPPORTS

- A. Install roof curbs for all roof mounted equipment. Coordinate location and installation of roof curbs with General Construction Division. Install in accordance with roofing manufacturer's standard details and comply with roofing system warranty requirements.

### 3.2 FLASHING

- A. Provide flexible flashing and metal counterflashing where ductwork penetrate weather or waterproofed walls, floors, and roofs.

### 3.3 SLEEVES

- A. Set sleeves in position in form work. Provide reinforcing around sleeves.
- B. Extend sleeves through floors one inch above finished floor level. Caulk sleeves full depth and provide floor plate.

### 3.4 LEAD PAINT HAZARD

- A. Work shall be conducted under the assumption that the existing roof and floor slab metal decks and structural steel contain lead surfaces, shall comply with all applicable OSHA, Federal, State, and Local Regulations. Contractor shall take appropriate precautions to protect workers when performing related work adjacent to these surfaces.

END OF SECTION 230529

## SECTION 230553 – HVAC IDENTIFICATION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Identification of mechanical products installed under Division 23.

#### 1.2 SUBMITTALS

- A. Submit product data for mechanical identification.
- B. Submit list of wording, symbols, letter size and color coding for mechanical identification.

### PART 2 – PRODUCTS

#### 2.1 MATERIALS

- A. Color: Unless specified otherwise, conform with ANSI/ASME A13.1.
- B. Stencils: With clean cut symbols and letters of following size:

<u>OUTSIDE DIAMETER OF INSULATION OR PIPE</u>	<u>LENGTH OF COLOR FIELD</u>	<u>SIZE OF LETTERS</u>
Up to 1¼"	8"	½"
1½" to 2"	8"	¾"
2½" to 6"	12"	1"

- C. Stencil Painting: Quick drying, no-smearing, gas and oil resistant paint manufactured for these type of applications.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials and for stencil painting.

### 3.2 INSTALLATION

- A. Plastic Nameplates: Install with corrosive-resistant mechanical fasteners, or adhesive.
- B. Equipment: Identify fans, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates or stencil painting. Small devices, such as in-line pumps, may be identified with plastic tags.
- C. Controls: Identify control panels and major control components outside panels with plastic nameplates.
- D. Ductwork: Identify ductwork with stenciled painting. Identify as to number, and area served. Locate identification at penetration of roof structure or enclosure, and at each obstruction.

END OF SECTION 230553

## SECTION 230593 – TESTING, ADJUSTING AND BALANCING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Testing, adjustment, and balancing of air systems.
- B. Measurement of final operating condition of HVAC systems.

#### 1.2 REFERENCES

- A. AABC - National Standards for Field Measurement and Instrumentation, Total System Balance.
- B. ASHRAE - Systems Handbook: Chapter, Testing, Adjusting and Balancing.
- C. NEBB - Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.

#### 1.3 SUBMITTALS

- A. Submit name of adjusting and balancing agency for review within 30 days after award of Contract.
- B. Submit test reports as a submittal.
- C. Prior to commencing work, submit draft reports indicating adjusting, balancing, and equipment data required.
- D. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect/Engineer and for inclusion in operating and maintenance manuals.
- E. 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.
- F. Include detailed procedures, agenda, sample report forms and copy of AABC National Project Performance Guaranty prior to commencing system balance.

#### 1.4 REPORT FORMS

A. Submit reports on AABC National Standards for Total System Balance.

B. Forms shall include the following information:

1. Title Page:

- a. Company name
- b. Company address
- c. Company telephone number
- d. Project name
- e. Project location
- f. Project Architect
- g. Project Engineer
- h. Project Contractor
- i. Project altitude

2. Instrument List:

- a. Instrument
- b. Manufacturer
- c. Model
- d. Serial number
- e. Range
- f. Calibration date

3. Air Moving Equipment:

- a. Location
- b. Manufacturer
- c. Model
- d. Air flow, specified and actual
- e. Return air flow, specified and actual
- f. Outside air flow, specified and actual
- g. Total static pressure (total external), specified and actual
- h. Inlet pressure
- i. Discharge pressure
- j. Fan RPM

4. Exhaust Fan Data:

- a. Location
- b. Manufacturer
- c. Model
- d. Air flow, specified and actual
- e. Total static pressure (total external), specified and actual
- f. Inlet pressure
- g. Discharge pressure
- h. Fan RPM

5. Return Air/Outside Air Data:
  - a. Identification/location
  - b. Design air flow
  - c. Actual air flow
  - d. Design return air flow
  - e. Actual return air flow
  - f. Design outside air flow
  - g. Actual outside air flow
  - h. Return air temperature
  - i. Outside air temperature
  - j. Required mixed air temperature
  - k. Actual mixed air temperature
  - l. Design outside/return air ratio
  - m. Actual outside/return air ratio
6. Electric Motors:
  - a. Manufacturer
  - b. HP/BHP
  - c. Phase, voltage, amperage; nameplate, actual, no load.
  - d. RPM
  - e. Service factor
  - f. Starter size, rating, heater elements
7. V-Belt Drive:
  - a. Identification/location
  - b. Required driven RPM
  - c. Driven sheave, diameter and RPM
  - d. Belt, size and quantity
  - e. Motor sheave, diameter and RPM
  - f. Center to center distance, maximum, minimum, and actual
8. Duct Traverse:
  - a. System zone/branch
  - b. Duct size
  - c. Area
  - d. Design velocity
  - e. Design air flow
  - f. Test velocity
  - g. Test air flow
  - h. Duct static pressure
  - i. Air temperature
  - j. Air correction factor



9. Air Distribution Test Sheet:

- a. Air terminal number
- b. Room number/location
- c. Terminal type
- d. Terminal size
- e. Area factor
- f. Design velocity
- g. Design air flow
- h. Test (final) velocity
- i. Test (final) air flow
- j. Percent of design air flow

1.5 PROJECT RECORD DOCUMENTS

- A. Submit record documents.
- B. Accurately record actual locations of flow balancers and settings.

1.6 QUALITY ASSURANCE

- A. Agency shall be company specializing in the adjusting and balancing of systems specified in this Section with minimum of 5 successfully completed projects of similar scope certified by AABC.
- B. Total system balance shall be performed in accordance with AABC National Standards for Field Measurement and Instrumentation, Total System Balance. ASHRAE - Systems Handbook.

1.7 SEQUENCING AND SCHEDULING

- A. Sequence Work to commence after completion of systems and schedule completion of Work before Substantial Completion of Project.

PART 2 - PRODUCTS

NOT USED

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Before commencing Work, verify that systems are complete and operable. Ensure the following:
  - 1. Equipment is operable and 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. Correct fan rotation.
  - 7. Fire and volume dampers are in place and open.
  - 8. Access doors are closed and duct end caps are in place.
  - 9. Air outlets are installed and connected.
  - 10. Duct system leakage has been minimized.
- B. Report any defects or deficiencies noted during performance of services to Architect/Engineer.
- C. Promptly report abnormal conditions in mechanical systems or conditions which prevent system balance.
- D. If, for design reasons, system cannot be properly balanced, report as soon as observed.
- E. Beginning of Work means acceptance of existing conditions.

### 3.2 PREPARATION

- A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect/Engineer to facilitate spot checks during testing.
- B. Provide additional balancing devices as required.

### 3.3 INSTALLATION TOLERANCES

- A. Adjust air handling systems to plus or minus 10 percent for supply systems and plus or minus 10 percent for return and exhaust systems from figures indicated.

### 3.4 ADJUSTING

- A. Recorded data shall represent actually measured, or observed condition.

- B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- E. At the time of final inspection, the Contractor shall recheck, in the presence of the Engineer and Owner, random selections of data, water and air quantities, air motion and sound levels recorded in the certified report. Points and areas for recheck shall be as selected by the Engineer. Measurement and test procedures shall be as approved for work forming basis of certified report.
- F. Selection for Recheck (Specific Plus Random): In general, selections for recheck will not exceed 25 percent of the total number tabulated in the report, except that special air systems may require a complete recheck for safety reasons.
- G. Retests: If random tests elicit a measured deviation of ten percent or more from that recorded in the certified report listing at ten percent or more of the recheck selections, the report shall be automatically rejected. In the event the report is rejected, all systems shall be readjusted and tested, new data recorded, new certified reports submitted and new inspection tests made.
- H. Check and adjust systems approximately six months after final acceptance and submit report.

### 3.5 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities.
- 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 extent that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers.
- F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. 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.

END OF SECTION 230593

## SECTION 230713 – DUCTWORK INSULATION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Ductwork insulation.
- B. Acoustic ductwork lining.
- C. Insulation jackets and accessories.

#### 1.2 REFERENCES

- A. ANSI/ASTM C553 - Mineral Fiber Blanket and Felt Insulation.
- B. ASTM E84 - Surface Burning Characteristics of Building Materials.
- C. NFPA 255 - Surface Burning Characteristics of Building Materials.
- D. UL 723 - Surface Burning Characteristics of Building Materials.
- E. Building Code of New York State
- F. Energy Conservation Construction Code of New York State.
- G. Mechanical Code of New York State.

#### 1.3 SUBMITTALS

- A. Include product description, list of materials and thickness for each service, and locations.
- B. Submit manufacturer's installation instructions.

#### 1.4 QUALITY ASSURANCE

- A. Applicator: Company specializing in ductwork insulation application with five (5) successfully completed projects of similar scope.
- B. Materials: UL listed; flame spread/smoke developed rating of 25/50 in accordance with ASTM E84, NFPA 255, UL 723.

- C. All materials, sealants, etc., to meet current VOC limit standards.
- D. Insulation thickness state shall be in accordance with the Energy Conservation Code of New York State or as scheduled (the more stringent shall apply).

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manville.
- B. Owens Corning.
- C. Armstrong.
- D. Or accepted equal.

### 2.2 MATERIALS

- A. Type A: Flexible glass fiber; ANSI/ASTM C553; commercial grade; 1.5 lb/cu.ft. minimum density, 'k' value of 0.25 at 75°F; foil scrim facing for air conditioning ducts, no facing required for heating and venting ducts. Manufacturer: Manville Type 150 Fiberglass Ductwrap Insulation (Design Make) or accepted equal.
- B. Type B: Rigid glass fiber; ANSI/ASTM C612, Class 1; 6.0 lb/cu.ft. minimum density, 'k' value of 0.24 at 75°F; 0.002 inch foil scrim facing for air conditioning ducts, no facing required for heating and venting ducts. Manufacturer: Manville 800 Series Spin-Glas, Type 814 Fiberglass Duct and Equipment Insulation (Design Make) or accepted equal.
- C. Type C: Flexible glass fiber; ANSI/ASTM C553; 'k' value of 0.24 at 75°F; 1.5 lb/cu.ft. minimum density; coated air side for maximum 4,000 ft/min air velocity. Liner to be Green Guard certified and adhered to ductwork per SMACNA requirements. Manufacturer: Manville Linacoustic (Design Make) or accepted equal.
- D. Adhesives: Waterproof fire-retardant type.
- E. Indoor Jacket: Canvas. Presized glass cloth, minimum 7.8 oz/sq yd.
- F. Lagging Adhesive: Fire resistive to ASTM E84, NFPA 255, UL 723.
- G. Impale Anchors: Galvanized steel, 12 gage, self-adhesive pad.
- H. Joint Tape: Glass fiber cloth, open mesh.

- I. Tie Wire: Annealed steel, 16 gage.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Install materials after ductwork has been tested and accepted.
- B. Clean surfaces for adhesives.

### 3.2 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Provide insulation with vapor barrier when air conveyed may be below ambient temperature.
- C. Insulate all new and existing ductwork per the Schedule in Article 3.3.
- D. On exposed ductwork, locate insulation and cover seams in least visible locations. Where finish painting is shown or specified, finish with canvas jacket and size for painting.
- E. Neatly finish insulation at supports, protrusions and interruptions. Discontinue insulation at penetrations in fire rated floors, ceilings, or walls and provide fire seal to maintain the separations fire rating.
- F. External Duct Insulation (Type A or Type B) Application:
  - 1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
  - 2. Install without sag on underside of ductwork. Use adhesive or mechanical fasteners where necessary to prevent sagging. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
- G. Liner (Type C) Application:
  - 1. Adhere insulation with adhesive for 100% coverage. Secure insulation with mechanical fasteners on 15" centers maximum on top and side of ductwork with dimension exceeding 20". Seal and smooth joints. Do not use nail-type fasteners. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
  - 2. Ductwork dimensions indicated are net inside dimensions required for air flow. Increase ductwork to allow for insulation thickness.

### 3.3 SCHEDULE

DUCTWORK	INSULATION TYPE	THICKNESS FINISH INCH
Exhaust, Relief or Vent Duct (Insulate 20' from Exterior air openings/plenums and where exposed to outdoor temperatures.)	Type A, where concealed Type B, where exposed	1" 1"
Supply Air and Return Air Ductwork		
- Where concealed	Type A	2"
- Where exposed (non air-conditioned spaces)	Type B	2"
- Where exposed (air-conditioned spaces)	Uninsulated	"
Return Air Ductwork (in conditioned spaces/return air ceiling plenums)	Uninsulated	
Acoustic Duct Liner (Where Indicated)	Type C	2"

END OF SECTION 230713



## SECTION 230923 - DIRECT DIGITAL CONTROL SYSTEMS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. The Contractor shall provide and install an integrated Energy Management System (EMS) based on state-of-the-art microprocessor technology. The system shall encompass all of the points described on the drawings and described herein. The system shall be complete in all respects including all control components, hardware and software required for proper system operation as described herein or as indicated on the drawings.
- B. The system shall be compatible and interoperate/interface completely with existing Siemens Energy Management System in Furnas Hall.
- C. All points shall be fully defined and usable at the existing DDC System operator's workstation. The system shall be configured as intelligent standalone distributed network processors, application specific controllers, and integrators for 3rd party controllers for HVAC, lighting and fire systems. This distributed architecture shall allow the operator workstations to function as an operator I/O and archive device only. All points will be fully accessible both for uploading and downloading.
- D. All materials and equipment used shall be standard components, regularly manufactured for this and/or other systems and not custom designed especially for this project. All systems and components shall have been thoroughly tested and proved in actual use in any installation similar to that proposed for the herein. Factory test installations are not acceptable as a "similar" acquisition.
- E. The EMS Contractor shall furnish and install all necessary hardware, provide and load all specified software, and turn over to the Owner's a completely operational system capable of performing all specified control and data acquisition.
- F. This Work shall include all electrical interlock and control wiring, connections to and interconnections between all HVAC equipment and appurtenances furnished and/or controlled under this contract.
- G. Provide all field devices including remote input/output devices, sensors, transmitters, relays, contactors, transducers, communication hardware and associated electronics required for complete system operation.

#### 1.2 COMPATIBILITY

- A. The building is served by an existing Siemens Energy Management and Control System. The new system components shall be of the same type, the programming language shall be the same as existing.

- B. The extension of the subject building's control system shall be compatible with the Owner's existing above-described master stations, permitting complete communication of all parameters hereinafter described without encumbering the existing system's operation relative to this and other buildings (locations). Gateways and PC desktop icons that "link" to separate systems are not acceptable. Any costs associated with connecting to the existing Energy Management System, including licensed software, programming, training, etc. shall be the responsibility of the EMS Contractor (no additional cost to the Owner). The contractor must demonstrate their ability to perform the integration to the existing Delta System prior to submittal acceptance and invoicing for any EMS related work.

### 1.3 RELATED WORK BY OTHER SECTIONS

- A. VAV Boxes: VAV terminal units shall be provided with factory controls. Controls contractor shall install and/or interface with manufacturer's specified controls.

### 1.4 REFERENCED STANDARDS, CODES AND ORDINANCES

- A. It is the responsibility of the EMS Contractor to be familiar with all codes, rules, ordinances, and regulations of the Authority Having Jurisdiction and their interpretations which are in effect at the site of the Work.
- B. The latest issue of applicable standards and recommended practices of the following agencies in effect shall form a part of the specification to the extent each agency's relative standards or recommended practices apply to the Systems and its components as specified herein.
  - 1. Federal Communications Commission (FCC)
  - 2. American National Standards Institute (ANSI)
  - 3. American Society of Mechanical Engineers (ASME)
  - 4. Electronic Industries Association (EIA)
  - 5. Institute of Electrical and Electronics Engineers (IEEE)
  - 6. National Electrical Manufacturers Association (NEMA)
  - 7. National Fire Protection Association (NFPA)
  - 8. Underwriters Laboratories (UL)
  - 9. Occupational Safety and Health Administration (OSHA)
  - 10. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE).
- C. The EMS Contractor shall be solely responsible for compliance with all health and safety regulations, performing the Work in a safe and competent manner, and use industry accepted installation procedures required for the Work as outlined in these documents.

- D. All systems equipment, components, accessories, software and installation hardware shall be new and free from defects and shall be UL listed where applicable. All components shall be in current production and shall be a standard product of the system or device manufacturer. Refurbished or reconditioned components are unacceptable. Each component shall bear the make, model number, device tag number (if any), and the UL label as applicable. All Systems components of a given type shall be the product of the same manufacturer.

## 1.5 QUALITY ASSURANCE

- A. Complete field testing, adjustment and checkout of the Energy Management System shall be performed by the manufacturer's representative as specified.
- B. Control system manufacturer shall have a minimum of 10 years experience with Energy Management (EMS) systems. Installing Contractor shall be manufacturer of equipment. The Energy Management System Contractor shall have a minimum of 10 years experience in temperature control field and shall have installed no less than 10 EMS of this size and complexity. Contractor shall have a factory-trained service office.
- C. 40 hours of on-site training of Facility maintenance personnel shall be provided.
- D. The Contract Documents are not intended to show all details. The Contractor shall secure satisfactory information before submitting the proposal/bid and include in the proposal/bid a sum sufficient to cover all items of labor and material required for the complete installation of the devices and systems described herein.
- E. All Work performed for this project will comply with all codes, laws and governing bodies. The Contractor shall be responsible for obtaining and payment of all permits.

## 1.6 EMS SINGLE SOURCE RESPONSIBILITY

- A. The EMS Contractor shall be fully responsible for the proper operation of the Energy Management Control System, including but not limited to, sensors and controls, communication links, and peripheral devices. After the installation, the Contractor shall be responsible for the debugging and calibration of the EMS.
- B. The EMS Contractor shall also be fully responsible for providing and loading the specified software packages, to include the loading of all necessary operational parameters. Any debugging of software problems shall be performed solely by the EMS Contractor.
- C. The Contractor shall have factory trained engineers on staff, fully capable of providing start-up assistance, Owner's personnel instruction, routine maintenance and twenty-four emergency maintenance service on all system components. The Contractor shall have a minimum of 10 years experience, specifically in the installation of temperature control systems.

- D. The Contractor shall also have the capability to interface with the EMS from a remote location through the specified modem over any voice grade telephone lines.

## 1.7 SUBMITTALS

- A. Product Data: Manufacturer's technical product data for Energy Management system components furnished; indicate dimensions, performance characteristics, electrical characteristics, and include installation and start-up instructions, as applicable.
- B. DDC System Summary Forms: Provide data summary forms to be approved by the Engineer to define the following information for inclusion into the EMS for each point in the system by the Contractor:
  - 1. Description of each piece of equipment and the functions to be controlled.
  - 2. For each DDC function, a listing of digital and/or analog hardware required to interface the Energy Management System to the equipment.
  - 3. Listing of all digital and analog alarms.
  - 4. Listing of all EMS application programs associated with each piece of equipment. This listing shall include all control algorithms and mathematical equations. The listing shall be in easy to understand English format.
- C. Point List: List of each control input and output; the device it is controlling; the location of the device, and the symbol or label of the control point in the software.
- D. Temperature Control Drawings:
  - 1. Provide wiring diagrams indicating all required electrical wiring, clearly differentiating between factory and field installed wiring. Include equipment manufacturer's wiring diagram clearly indicating Energy Management System interface.
  - 2. Provide control drawings with an outline of each system being controlled and location of devices. Label each control device with setting and adjustable range.
- E. Sequence of Operation: A detailed sequence of operation describing exact method of control.
- F. Field Test Results: Results of functional and diagnostic tests and calibrations.
- G. Training Materials: Provide course outline and materials for each class at least six weeks before first class. Training shall be furnished via instructor-led sessions, computer-based training, or web-based training. Engineer will modify course outlines and materials if necessary to meet Owner's needs. Engineer will review and approve course outlines and materials at least three weeks before first class.

H. Operation and Maintenance Data: Provide software and maintenance manuals as described below:

1. Software Manuals: The software manual shall describe programming and testing, starting with a system overview and proceeding to a detailed description of each software feature. The manual shall instruct the user on programming or reprogramming any portion of the DDC System. This shall include control programs, algorithms, mathematical equations, variables, set points, time periods, messages, and other information necessary to load, alter, test and execute the system.
2. Maintenance Manual: The maintenance manual shall provide descriptions of Maintenance on all system components, including sensors and controlled devices. They shall cover inspection, periodic preventative maintenance, fault diagnosis, and repair or replacement of defective components.
3. Include these manuals, product data, DDC system summary forms and "as-built" point lists, temperature control Drawings and sequences of operation in the Operation and Maintenance Manual.

## 1.8 WARRANTY

- A. The Energy Management and Control System, including all hardware and software components, shall be warranted for a period of one year following the date of final acceptance of the system, guaranteeing service calls within 8 hours of notification during Monday through Friday and 24 hours on weekends. Provide service, parts and labor to correct all system defects arising during this period without cost to the Owner.
- B. Provide four complete inspections (one in each season), to inspect, calibrate, and adjust controls as required, and submit written reports to the Owner.
- C. The option for continued maintenance and monitoring for years 2, 3, 4 and 5 shall be made available to the Owner.

## 1.9 ELECTRICAL WORK AND SAFETY REQUIREMENTS

- A. Electrical work shall be in accordance with Division 26, applicable NFPA, ANSI C2 and UL requirements. Fully enclose or properly guard electrical wiring, terminal blocks and other high voltage contacts and mark to prevent accidental injury to personnel.
- B. All wiring associated with and required by the EMS shall be the responsibility of the EMS Contractor.
- C. Comply with all the latest Federal, State, and Local rules, regulations, and ordinances having jurisdiction over this work, including OSHA requirements as they apply to the Owner. These codes shall supersede the specifications and drawings. All Work under this contract shall be in accordance with the latest editions of the National Electrical Code and the electric codes in the locale in which the work is being performed.

- D. The term "wiring" shall be construed to include furnishing of wire, conduit, miscellaneous materials, and labor as required for mounting and connecting electrical control devices, and providing electrical interlocks between equipment. Low voltage sensor wiring shall be installed per NEC and local codes.
- E. All line voltage interlock wiring is to be run in thin-wall conduit in equipment rooms and in rigid conduit, when installed in floor slabs or underground areas.
- F. Low voltage (below 30 volts AC or DC) electronic control wiring in concealed but accessible locations may be installed without conduit.
- G. All cable runs in concealed but accessible areas shall be approved for plenum installation or run in conduit.
- H. Utilize EMT in all mechanical rooms and where exposed to damage.
- I. All control wiring for sensors, transducers, communication networks, etc. shall be twisted, shielded #18 gage wire with plenum-rated jacket.
- J. All control wiring in concealed, but accessible, areas shall be marked every ten (10) feet with a plastic tag indicating wire is part of "Energy Management System".

#### 1.10 CONTROL ENCLOSURES

- A. All controllers, transducers and associated control components shall be mounted in metal or plastic control cabinets.
- B. Metal cabinets shall be of metal (aluminum or steel) construction.
- C. The cabinet door shall be key lockable and be supported by a piano-type hinge the entire length of the door. The cabinet shall carry a UL50 listing for line voltage applications and meet NEMA 1 standards as a minimum. Cabinets shall be grounded as per Division 26 requirements.

#### 1.11 MANUFACTURER'S RECOMMENDATIONS

- A. Where installation procedures, or any part thereof, are required to be in accordance with the recommendations of the manufacturer of the material being installed, furnish printed copies of these recommendations to the Engineer. Failure to furnish these recommendations shall be cause for rejection of material.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. This specification defines the minimum equipment and performance requirements for a direct digital Energy Management System. The Energy Management System shall be capable of performing, without any additional equipment, all of the automatic temperature control and energy management functions described herein.
- B. The Energy Management System shall monitor and control the equipment as indicated in the System Summary Sheet and with respect to the "Description of Operation" specified herein and/or described on the Drawings. Provide all hardware and software necessary to accomplish these operations. This includes all relays and transducers required to perform the sequences intended.
- C. The system shall be UL 916 approved as an Energy Management System and Smoke Control UL UUKL 864.
- D. All output signals will be provided with manual override switches in the associated control panel to allow manual operation.
- E. All control functions shall be executed via direct digital control algorithms.
- F. The user shall be able to customize control strategies and sequences of operation as desired.
- G. Computer equipment shall operate satisfactory within a range of 0°C to 50°C and from 10% to 90% relative humidity.
- H. Materials, software and equipment used in the Energy Management System shall be essentially the cataloged products of the manufacturers, regularly engaged in the production of such materials or equipment shall be the manufacturer's latest standard design that complies with the specification requirements. Each major component and software packages shall have the manufacturer's name and address and the model and serial number on a nameplate securely attached in a conspicuous place.
- I. Acceptable Manufacturers: Siemens (Design Make), No Substitutions.

### 2.2 SYSTEM ARCHITECTURE

- A. The control system shall consist of a high-speed, peer-to-peer network of DDC controllers and a web-based operator interface. Depict each mechanical system and building floor plan by a point-and-click graphic. A web server with a network interface card shall gather data from this system and generate web pages accessible through a conventional web browser on each PC connected to the network. Operators shall be able to perform all normal operator functions through the web browser interface.



- B. The Energy Management System shall be capable of integrating multiple building functions including equipment supervision and control, alarm management, energy management, and historical data collection and archiving.
- C. The system shall directly control HVAC equipment as specified in Sequences of Operation. Each zone controller shall provide occupied and unoccupied modes of operation by individual zone. Furnish energy conservation features such as optimal start and stop, night setback, request-based logic and demand level adjustment of setpoints as specified in Appendix A.
- D. The Energy Management System shall consist of the following:
  - 1. Standalone network panels
  - 2. Standalone application specific controllers (ASCs)

The system shall have a modular architecture, and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, standalone network panels, and operator devices.

- E. System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution. Each network panel shall operate independently by performing its own specified control, alarm management, operator I/O, and historical data collection. The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.
- F. Standalone network panels shall be able to access any data from, or send control commands and alarm reports directly to any other network panel or combination of panels on the network without dependence upon a central processing device, including a Central File Server. Standalone network panels shall also be able to send alarm reports to multiple operator workstations, terminals, and printers without dependence upon a central processing device or File Server.

## 2.3 STANDALONE NETWORK PANELS

- A. Standalone network panels shall be microprocessor based, multi-tasking, multi-user, real-time digital control processors. Each standalone network panel shall consist of modular hardware with plug-in enclosed processors, communication controllers, power supplies, and input/output modules. A sufficient number of controllers shall be supplied to fully meet the requirements of this specification and the attached point list.
- B. Memory: Each network panel shall have sufficient memory to support its own operating system and databases including:
  - 1. Control Processes
  - 2. Energy Management Applications
  - 3. Alarm Management
  - 4. Historical/Trend Data for all points



5. Maintenance Support Applications
  6. Custom Processes
  7. Operator I/O
  8. Dial-Up Communications
  9. Manual Override Monitoring
  10. Lighting Control Points
  11. Integrator Software for 3rd Party Controllers
  12. Transaction Logging for all points
  13. Password Access Control
- C. Point Types: Each network panel shall support the following types of point inputs and outputs:
1. Digital Inputs for status/alarm contacts.
  2. Digital Outputs for on/off equipment control.
  3. Analog Inputs for temperature, pressure, humidity, flow, and position measurements.
  4. Analog Outputs for valve and damper position control, and capacity control of primary equipment.
  5. Pulse Inputs for pulsed contact monitoring.
- D. Expendability: The system shall be modular in nature, and shall permit easy expansion through the addition of software applications, workstation hardware, field application specific controllers, integrator panels, sensors, and actuators.
- E. Serial Communication Ports: Standalone network panels shall provide at least two RS-232C serial data communication ports for simultaneous operation of multiple operator I/O devices such as industry standard printers, laptop workstations, PC workstations, and panel mounted or portable network panel Operator's Terminals. Standalone network panels shall allow temporary use of portable devices without interrupting the normal operation of permanently connected modems, printers, or network terminals.
- F. Integrated On-Line Diagnostics: Each network panel shall continuously perform self-diagnostics, communication diagnosis and diagnosis of all subsidiary equipment. The network panel shall provide both local and remote annunciation of any detected component failures, or repeated failure to establish communication. Indication of the diagnostic results shall be provided at each network panel, and shall not require the connection of an operator I/O device.
- G. Surge and Transient Protection: Isolation shall be provided at all network terminations, as well as all field point terminations to suppress induced voltage transients consistent with IEEE Standard 587-1980. Isolation levels shall be sufficiently high as to allow all signal wiring to be run in the same conduit as high voltage wiring where acceptable by electrical code.

- H. Powerfail Restart: In the event of the loss of normal power, there shall be an orderly shutdown of all standalone network panels to prevent the loss of database or operating system software. Non-Volatile memory shall be incorporated for all critical controller configuration data, and battery back-up shall be provided to support the real-time clock and all volatile memory for a minimum of 72 hours. Upon restoration of normal power, the network panel shall automatically resume full operation without manual intervention. Should network panel memory be lost for any reason, the user shall have the capability of reloading the network panel via the local area network, via the local RS-232C port, or via telephone line dial-in.
- I. Integral Operator Interface: Each standalone network panel shall include a menu-driven, liquid-crystal display with touchpad interface (Network Terminal). The Network Terminal shall include:
  - 1. Touchscreen input 16-line x 40 character, 256 x 128 dot-matrix, backlit liquid crystal, multiple point display screen.
  - 2. Fully prompted menu driven input.
  - 3. Total access to information and commands anywhere within the network.
  - 4. Context-sensitive Online Help screens.
  - 5. English commands and point descriptors, totally consistent with Operator Workstation interface.
  - 6. Six levels of password access.

## 2.4 APPLICATION SPECIFIC CONTROLLERS - HVAC APPLICATIONS

- A. Each Standalone Network Controller shall be able to extend its performance and capacity through the use of remote Application Specific Controllers (ASCs).
- B. Each ASC shall operate as a standalone controller capable of performing its specified control responsibilities independently of other controllers in the network. Each ASC shall be a microprocessor-based, multi-tasking, real-time digital control processor.
- C. Each ASC shall have sufficient memory to support its own operating system and data bases including:
  - 1. Control Processes
  - 2. Energy Management Applications
  - 3. Operator I/O (Portable Service Terminal)
- D. The operator interface to any ASC point data or programs shall be through any network-resident PC workstation, or any PC or portable operator's terminal connected to any network panel in the network.

- E. Application Specific Controllers shall directly support the temporary use of a portable service terminal. The capabilities of the portable service terminal shall include but not be limited to the following:
  - 1. Display temperatures
  - 2. Display status
  - 3. Display setpoints
  - 4. Display control parameters
  - 5. Override binary output control
  - 6. Override analog setpoints
  - 7. Modification of gain and offset constants
- F. Powerfail Protection: All system setpoints, proportional bands, control algorithms, and any other programmable parameters shall be stored such that a power failure of any duration does not necessitate reprogramming the controller.
- G. Configuration and Download: The ASC's shall have the capability of receiving configuration and program loading by the following:
  - 1. Locally, via a direct connect portable laptop service tool.
  - 2. Over the network, from the portable laptop service tool.
  - 3. From the Operator Workstation, via the communication networks.

## 2.5 WEB BASED CONTROL SYSTEM

- A. General Description: BAS Supplier shall provide web-based access to the system as part of standard installation. User shall be able to access all displays of real-time data that are part of the BAS via a standard Web browser. Web browser shall tie into the network via owner-supplied Ethernet network connection. Web-page host shall be a separate device that resides on the BAS BACnet network, but is not the BAS server for the control system. BAS server must be a separate computer from the Web-page host device to ensure data and system integrity. The web-page software shall not require a per user licensing fee or annual fees. The web-page host must be able to support on average 50 simultaneous users with the ability to expand the system to accommodate an unlimited number of users.
- B. Browser Technology: Browser shall be standard version of Microsoft IE 5.5 or later and Netscape Navigator 4.76 or later. No special vendor-supplied software shall be needed on computers running browser. All displays shall be viewable and the Web-page host shall directly access real-time data from the BAS BACnet network. Data shall be displayed in real time and update automatically without user interaction. User shall be able to change data on displays if logged in with the appropriate user name and password.

C. Communications:

1. Web-page host shall include two Ethernet network connections. One network connection shall be dedicated to BAS BACnet network and shall be used to gather real-time data from all the BACnet devices that form the BAS. This network shall communicate via BACnet, allowing the Web-page host to gather data directly from units on the local LAN or from other projects connected over a WAN. This network shall also provide the connection to the BAS server for Web page generation.
2. The second Ethernet connection shall provide the physical connection to the Internet or an IP-based WAN. It shall be the port that is used for the browser to receive Web pages and data from the Web-page host. The Web-page host shall act as a physical barrier between the BAS network and the WAN or Internet connection that allows the browser to receive web pages and data. The two separate network connections provide for a physical barrier to prevent raw BACnet traffic being exposed on the IP network.
3. The Web-page host shall provide for complete isolation of the IP and BACnet networks by not routing networking packets between the two networks.
4. BAS BACnet Ethernet network shall be provided and installed by the BAS supplier. Owner shall provide and incur any monthly charges of WAN/Internet connection.

D. Display of Data:

1. Web page graphics shown on browser shall be replicas of the BAS displays. User shall need no additional training to understand information presented on Web pages when compared to what is shown on BAS displays. Web page displays shall include animation just as BAS displays. Fans shall turn, pilot lights shall blink, coils shall change colors, and so on.
2. Real-time data shall be shown on all browser Web pages. This data must be directly gathered via the BACnet network and automatically updated on browser Web page displays without any user action. Data on the browser shall automatically refresh as changes are detected without re-drawing the complete display.
3. It shall be possible for user from browser Web page to change data if the user is logged on with the appropriate password. Clicking on a button or typing in a new value shall change digital data. Using pull-down menus or typing in a new value shall change analog data.
4. Data displays shall be navigated using pushbuttons on the displays that are simply clicked on with the mouse to select a new display. Alternatively, the standard back and forward buttons of the browser can be used for display navigation.

- E. Web Page Generation: Web pages shall be generated automatically from the BAS displays that reside on the BAS server. User shall access Web-page host via the network and shall initiate a web page generation utility that automatically takes the BAS displays and turns them into Web pages. The Web pages generated are automatically installed on the Web page host for access via any computer's standard browser. Any system that requires use of an HTML editor for generation of Web pages shall not be considered.

- F. Password Security and Activity Log: Access via Web browser shall utilize the same hierarchical security scheme as BAS system. User shall be asked to log in once the browser makes connection to Web-page host. Once the user logs in, any and all changes that are made shall be tracked by the BAS system. The user shall be able to change only those items that the user has authority to change. A user activity report shall show any and all activity of the users that have logged in to the system regardless of whether those changes were made using a browser or via the BAS workstation.
- G. BACnet Communication: Web-page host shall communicate using the ASHRAE BACnet protocol standard to all devices on the BAS network.

## 2.6 NETWORKING/COMMUNICATIONS

### A. Local Area Network:

1. Network panels shall directly reside on a local area network such that communications may be executed directly between controllers, directly between work stations, and between controllers and workstations on a peer-to-peer basis.
2. Dynamic Data Access: All operator devices, either network resident or connected via dial up modems, shall have the ability to access all point status and application report data, or execute control functions for any and all other devices via the local area network. Access to data shall be based upon logical identification of building equipment. Access to system data shall not be restricted by the hardware configuration of the Energy Management System. The hardware configuration of the EMS network shall be totally transparent to the user when accessing data or developing control programs.
3. General Network Design: Network design shall include the following provisions:
  - a. High speed data transfer rates for alarm reporting, quick report generation from multiple controllers, and upload/download efficiency between network devices. The minimum baud rate shall be 2.5 Megabaud.
  - b. Support of any combination of controllers and operator workstations directly connected to the local area network. A capability of 50 devices shall be supported on a single local area network.
  - c. Detection and accommodation of single or multiple failures of either workstations, network panels or the network media. The network shall include provisions for automatically reconfiguring itself to allow all operational equipment to perform their designated functions as effectively as possible in the event of single or multiple failures.
  - d. Message and alarm buffering to prevent information from being lost.
  - e. Error detection, correction, and retransmission to guarantee data integrity.
  - f. Default device definition to prevent loss of alarms or data, and ensure alarms are reported as quickly as possible in the event an operator device does not respond.
  - g. Use of an industry standard IEEE 802.x protocol. Communications must be of a deterministic nature to assure calculable performance under worst-case network loading.

- h. Synchronization of the real time clocks in all network panels shall be provided.
- 4. Auto-dial/auto answer communications shall be provided to allow stand alone network panels to communicate with remote operator stations on an intermittent basis via telephone lines.
- 5. Standalone network panels shall analyze and prioritize all alarms to minimize the initiation of calls. Non-critical alarms shall be buffered in memory and reported as a group of alarms, or until an operator manually requests an upload of all alarms.
- 6. The auto-dial program shall include provisions for handling busy signals, "no-answers", an incomplete data transfers. Default devices shall be called when communications cannot be established with primary devices.
- 7. Dial-up workstations: The Operator at the dial-up workstation shall be able to perform all control functions, all report functions, and all database generation and modification functions as described for workstations connected via the local area network. Routines shall be provided to automatically answer calls, and either file or display information sent from remote network panels. The fact that communication is taking place with remote control systems over telephone lines shall be completely transparent to an operator.
  - a. An operator shall be able to access remote buildings by selection of any Energy by its logical name. The PC dial-up program shall maintain a user-definable cross-reference of buildings and associated telephone numbers, so the user shall not be required to remember or manually dial telephone numbers.
  - b. The PC workstation may serve as an operator device on a local area network, as well as a dial-up workstation for multiple auto-dial network panels or networks. Alarm and data file transfers handled via dial-up transactions shall not interfere with local area network activity, nor shall local area network activity keep the workstation from handling incoming calls.
- 8. Dial-up communications shall make use of Hayes compatible 28,800 baud modems and voice grade telephone lines. Each standalone network panel shall have its own modem.

## 2.7 INTEGRATION WITH THIRD-PARTY MANUFACTURER'S EQUIPMENT

- A. General: The Energy Management System (EMS) shall be capable of interoperating with multiple building systems supplied by different manufacturers. The EMS shall be able to receive, react to, and in some cases, return information from multiple building systems. Point inputs and outputs from the third-party controllers shall have real-time interoperability with EMS software features such as: Control Software, Energy Management, Custom Process Programming, Alarm Management, Historical Data and Trend Analysis, Totalization, and Dial-Up and Local Area Network Communication, as mentioned earlier in the specification.

B. Networking/Communications:

1. The EMS shall support any combination of third-party controllers (if more than one third-party manufacturer is being integrated) on a single distributed network.
2. A minimum of 100 third-party controllers shall be supported on a single network.
3. Integration shall be by RS-232 or RS-485 technologies. Third party controllers shall be connected to the network as other application specific controllers on the distributed network. Third party integrations that are connected directly to I/O ports on the operator workstation or file servers for point passing are not acceptable.
4. All third-party integration packages shall be fully documented and supported as a standard product from the control manufacturers factory which shall provide long-term customer support. Custom integrations that are not factory supported are not acceptable.

2.8 SYSTEM SOFTWARE FEATURES

A. Control Software Description:

1. Pre-Tested Control Algorithms: The network panels shall have the ability to perform the following Pre-tested control algorithms:
  - a. Two Position Control
  - b. Proportional Control
  - c. Proportional plus Integral Control
  - d. Proportional, Integral, plus Derivative Control
  - e. Automatic Control Loop Tuning
2. Equipment Cycling Protection: Control software shall include a provision for limiting the number of times each piece of equipment may be cycled within any one-hour period.
3. Heavy Equipment Delays: The system shall provide protection against excessive demand situations during start-up periods by automatically introducing time delays between successive start commands to heavy electrical loads.
4. Powerfail Motor Restart: Upon the resumption of normal power, the network panel shall analyze the status of all controlled equipment, compare it with normal occupancy scheduling, and turn equipment on or off as necessary to resume normal operation.

B. Energy Management Applications: Network panels shall have the ability to perform any or all of the following energy management routines:

1. Time of Day Scheduling
2. Calendar Based Scheduling
3. Holiday Scheduling
4. Temporary Schedule Overrides
5. Optimal Start
6. Optimal Stop



7. Night Setback Control
8. Enthalpy Switchover (Economizer)
9. Peak Demand Limiting
10. Temperature Compensated Load Rolling
11. Fan Speed/CFM Control
12. Heating/Cooling Interlock
13. Hot Water Reset
14. Chilled Water Reset
15. Supply Air Reset

- C. Alarm Management: Alarm management shall be provided to monitor, buffer, and direct alarm reports to operator devices and memory files. Each network panel shall perform distributed, independent alarm analysis and filtering to minimize operator interruptions due to non-critical alarms, minimize network traffic, and prevent alarms from being lost. At no time shall the network panel's ability to report alarms be affected by either operator activity at a PC Workstation or local I/O device, or communications with other panels on the network.
- D. Historical Data and Trend Analysis: A variety of Historical data collection utilities shall be provided to automatically sample, store, and display system data in all of the following ways.
- E. Runtime Totalization: Standalone network panels shall automatically accumulate and store runtime hours for binary input and output points as specified in the Execution portion of this specification.
1. The Totalization routine shall have a sampling resolution of one minute or less.
  2. The user shall have the ability to define a warning limit for Runtime Totalization. Unique, user-specified messages shall be generated when the limit is reached.

## 2.9 TEMPERATURE SENSORS

- A. Temperature sensors shall be RTD type. Analog temperature sensors shall provide an output signal that varies continuously with the sensed temperature, within a specified range. Binary temperature sensors shall provide an output signal that is either on or off depending upon whether the sensed temperature is above or below the setpoint temperature.

All sensors of a particular category shall be of the same type and manufacturer. Provide temperature sensors suitable for one or more of the following mounting methods:

1. Insertion Type - Suitable for insertion into air ducts at any angle, and shall have a minimum insertion of 6".
2. Immersion Type - Suitable for immersion into fluids in tanks or pipes with separable well and heat transfer compound.



3. Averaging Type with Extended Element - Suitable for duct mounting to obtain average temperature by sampling along a capillary tube element not less than eight (8) feet in length.
4. Outside Air Sensing Type - Shall have sun shades to minimize solar effects and shall be mounted to minimize building outside air film effects.
5. Sensors Public Spaces (Corridors, stairwells, etc.) shall be flush plate types with no local control. Capability.
6. Space Type - shall be provided with guards in classrooms and where indicated on drawings.
7. Space Type - shall be provided with occupied/unoccupied override switches.
8. Space Type - shall be provided with local control adjustment to allow up to +3°F (adjustable) differential from setpoint.

B. The following shall apply to temperature sensors:

1. All external trim material shall be completely corrosion resistant with all parts assembled into a watertight, vibration-proof, heat resistant assembly.
2. Sensor wells shall be brass and compatible with the sensor.

## 2.10 DIFFERENTIAL PRESSURE SWITCHES

- A. All pressure sensing elements shall be corrosion resistant.
- B. Pressure sensing elements shall be diaphragm type as required by the application.
- C. Units shall have adjustable range and differential pressure settings.
- D. Pressure sensor switches shall be snap action type.
- E. Sensor assembly shall operate automatically and reset automatically when conditions return to normal.
- F. Protect complete sensor assembly against vibration at all critical movement pivots and slides.
- G. Sensors on all liquid lines shall have an isolation valve installed between each sensor and its pressure source.
- H. Sensor Ratings: Sensors shall have the following pressure and accuracy ratings:
  1. Water pressure sensors shall be rated at 125 PSIG, with an accuracy of plus or minus 1 PSI.

## 2.11 STATIC PRESSURE TRANSMITTERS

- A. The sensors shall be a variable capacitance type, utilizing a stainless steel diaphragm and insulated electrode for positioning of the diaphragm provide isolation and bypass hand valves.
- B. The sensor shall produce a linear 4 to 20 mA or 0-5 VDC with accuracies of 1% full scale in normal ambient temperature environments.
- C. Pressure ranges 0 to 0.1 in w.g. through 0 to 25.0 in w.g.
- D. The transmitter shall be temperature compensated to account for any thermal error over the entire temperature range of 40°F to 100°F , 0 to 95% RH. Over pressurization 10 in w.g. up to ten times range.
- E. The transmitter shall have zero span adjustment capability, but shall be factory calibrated.

## 2.12 CURRENT SWITCH

- A. Current switch shall be solid state self-powered and designed to sense AC current in a conductor passed through its circular window opening and provide an on/off status indication of the powered equipment.
- B. Manufacturer: Veris Type 705, 800, 735.

## 2.13 ANALOG TRANSDUCER

- A. The analog transducers shall be capable of converting the digital output electronic signal of the microprocessor controller to an analog electric output signal. The rate adjustment shall be separately independently adjustable.
- B. Resistor Network Transducer (RE):
  - 1. Modulation of 0-1,000 ohm actuators.
  - 2. 3-wire variable resistance output.
  - 3. Multiplexed over 12-wire parallel buss.
- C. Voltage Output Transducer (VO):
  - 1. 0-15V DC modulated output.
  - 2. 24V DC power requirement.

## 2.14 OPERATOR INTERFACE

### A. Basic Interface Description:

1. The Operator Workstation is existing. The new systems shall be included on the existing Operator Workstation and all points will be mapped to updated graphics for systems included in the project. The system operator shall perform all person machine interface functions (ie. -start/stop, setpoints) by use of the mouse and by finger touch on monitor screen. Touch devices which overlay on monitor screen are not acceptable.
2. The operator interface shall allow the operator to perform commands including, but not limited to, the following:
  - a. Start-up or shutdown selected equipment.
  - b. Adjust setpoints.
  - c. Add/Modify/Delete time programming.
  - d. Enable/Disable process execution.
  - e. Lock/Unlock alarm reporting for each point.
  - f. Enable/Disable Totalization for each point.
  - g. Enable/Disable Trending for each point.
  - h. Override PID Loop setpoints.
  - i. Enter temporary override schedules.
  - j. Define Holiday Schedules.
  - k. Change time/date.
  - l. Enter/Modify analog alarm limits.
  - m. Enter/Modify analog warning limits.
  - n. View limits.
  - o. Enable/Disable Demand Limiting for each meter.
  - p. Enable/Disable Duty Cycle for each load.
3. Reports shall be generated automatically or manually, and directed to either displays, printers, or disk files.

### B. Color graphic floor plan displays, and system schematics for each piece of mechanical equipment, including air handling units, pumps, chillers, etc. shall be provided as specified in the Scope of Work portion of this specification to optimize system performance analysis and speed alarm recognition.

1. The operator interface shall allow users to access the various system schematics and floor plans via a graphical penetration scheme, menu selection, or text-based commands.

2. Dynamic temperature values, humidity values, flow values, and status indication shall be shown in their actual respective locations, and shall automatically update to represent current conditions without operator intervention.
  3. The windowing environment of the PC Operator Workstation shall allow the user to simultaneously view several graphics at the same time to analyze total building operation, or to allow the display of a graphic associated with an alarm to be viewed without interrupting work in progress.
- C. All temperature and equipment control strategies and energy management routines shall be definable by the operator. System definition and modification procedures shall not interfere with normal system operation and control.

### PART 3 - EXECUTION

#### 3.1 COORDINATION

- A. Ensure installation of components is complementary to installation of similar components in other systems.
- B. Coordinate installation of system components with existing mechanical equipment and controls.
- C. Ensure system is completed and commissioned.

#### 3.2 INSTALLATION

- A. Each system installation shall be supervised, tested, adjusted, and approved by authorized representative of the manufacturer of the system device and equipment.
- B. Submit written statement from the authorized representative of the manufacturer of the system devices and equipment that the completed system has been inspected and tested and is approved.
- C. All products shall be installed in strict accordance with the manufacturer's printed instructions.
- D. Failure modes shall be tailored for each system's controlled devices. In the event of a controller failure, all valves, dampers, etc., shall fail-safe. Controller failure shall not inhibit existing safety controls (low limits as required, smoke detectors, flow switches, etc.) from performing their intended function.

E. Wiring:

1. Wiring installation shall be in accordance with National Electrical Code Requirements, and Division 26 Electrical Specifications.
2. All power and control wiring (above 30 volts) shall be installed in NEC approved metallic raceway system. Cross-sectional area of all wires installed in a conduit shall not exceed 40% of the cross-sectional area of the conduit in which they are enclosed.
3. Low voltage temperature control wiring (below 30 volts):
  - a. Low voltage wiring shall be installed in NEC approved metallic raceway system, unless otherwise specified. For concealed low voltage wiring installed above accessible ceilings, open wiring may be run.
  - b. Low voltage wiring in exposed areas of the building with existing exposed conduit shall be installed in conduit.
  - c. Low voltage wiring in exposed areas of the building with no existing exposed conduit shall be installed in surface raceway.
4. Locations (areas above accessible ceilings) where low voltage temperature control wiring is specifically allowed to be installed without metallic raceway system, open wiring shall be installed in a neat workmanlike manner and as follows:
  - a. Bundled and independently supported at maximum of 10' intervals from the building structure. Excessive sagging is not allowed.
  - b. Run parallel to building structure.
  - c. Located minimum of 12" away from hot water piping.
  - d. Located minimum 36" from heat coil compartment of any HVAC system.
  - e. Secured to each equipment housing it enters, so as to prevent having constant pulling tension at the termination.
5. Provide 115 VAC (+10%) to each Controller from the nearest available branch circuit panel, clearly indicate circuit breaker used. Provide circuit breaker if no spare is available. Provide a #12 AWG THHN green ground wire. Power to all EMS control components will be by the EMS Contractor.
6. Provide all trunk cable between Controllers within each system; cable type as required by equipment supplier.

3.3 SERVICE AND GUARANTEE

- A. After completion of the installation, representatives of the temperature control contractor shall calibrate and adjust all controls, and place them in complete operating condition. The control system herein specified shall be free from defects in workmanship and material under normal use and service.

### 3.4 RECORD DRAWINGS

- A. Record drawings will be supplied by the Contractor after the system has been accepted but prior to final payment. Drawings shall represent the as-built condition of the system and incorporate all information supplied with the approved submittal. All drawings shall be done in AUTOCAD.

### 3.5 ACCEPTANCE

- A. Upon completion and checkout of the system, the Contractor shall request in writing, the Owner's Representative to inspect and approve the satisfactory operation of the control system. If the inspection yields unacceptable items, the Owner's Representative shall prepare a punch list. After all items appearing on the punch list are completed, a second written request for system approval will be made. As each item is approved, an appropriate notation will be entered on the system report at the time of joint inspection with countersignature of the Owner's Representative and date. A copy of this report will be made for the Owner's Representative.  
When the punch lists are complete, or when the Owner is substantially benefiting from the use of the system, the Contractor shall notify the Owner's Representative, in writing, of the start of substantial completion and warranty. The Contractor shall request "final acceptance" after substantial completion and after record drawings and maintenance manuals.

### 3.6 TESTS

- A. This Work shall include pre-delivery testing of major components, field testing and adjustment of major subsystems and of the complete EMS, and an on-site final operational acceptance test of the complete operational EMS. Provide performance certifications of the required tests. Acceptance of tests by the Owner/Engineer shall not relieve the Contractor of responsibility for the complete system meeting the requirements of these specifications after installation.
- B. Field Test: After installation of the field panels and related peripherals, and the field interface devices and sensors, calibrate equipment and check transmission media.
- C. Operational Acceptance Test: Conduct final operational test on the complete, totally installed and operational Energy Management System to demonstrate that it is functioning properly in accordance with all requirements of this specification. Conduct a full follow-up test in the off season from initial start-up. Demonstrate the correct operation of all monitored and controlled points as well as the operation and capabilities of all sequences, reports, specialized control algorithms, diagnostics, and all other software. Final acceptance of the system shall be made, provided the Contractor has satisfied all other requirements of this specification.

- D. The EMS Contractor shall provide to the Engineer for operational acceptance the following documents generated by the EMS.
1. All Points Summary
  2. Alarm Point Summary
  3. Alarm Message Summary
  4. Totalization Summary
  5. Trend Log of Temperature Points Over 24 Hour Period
  6. Start/Stop times for all Mechanical Systems
  7. Optimal Start/Stop Parameters
  8. Software Documentation for all EMS Programs installed in Application Specific Controllers and Central Station
- E. Where it is required for the Contractor to modify, alter, add or remove hardware or software programs of the EMS or related accessories for the purpose of testing, these changes shall be done as required by the Contractor until such time acceptable performance of the EMS has been established. Problems which occur within approved hardware or software shall be corrected in an appropriate fashion under guarantee. Any such occurrence shall not void previous approval; however, the Contractor shall be responsible for prompt remedial action. Appropriate logs, schedules, and reports shall be maintained by the Engineer to reflect these items and their address.
1. Prior to final acceptance, a complete demonstration and readout of the computer real-time responsibilities of surveillance and command shall be performed in the presence of the Engineer. This demonstration, having satisfactorily met previously approved submittals, shall, with the Owner's Representative's written acceptance, allow commissioning of the EMS for on-line testing.
  2. Upon successful completion of system installation, the Engineer shall be requested in writing to inspect and approve the satisfactory operation of all components of the EMS. Upon receipt of a detailed "punch list" from the Engineer, an installation inspection report shall be submitted by the EMS contractor showing each outstanding item on the punch list. After all items appearing on the installation/inspection report are completed, a second written request for system approval will be made to the Engineer. As each or all items are approved, an appropriate notation will be entered at the time of joint inspection on the system report with counter signature of the Owner and Engineer. A copy of this report will be made for the Owner.
  3. Problems which occur within approved hardware or software shall be corrected in an appropriate fashion under guarantee. Any such occurrence shall not void previous approval; however, the Contractor shall be responsible for prompt remedial action. Appropriate logs, schedules, and reports shall be maintained by the Engineer to reflect these items and their redress.

### 3.7 OPERATOR INSTRUCTION

- A. After system commissioning the Contractor shall provide on-site operator instruction to the Owner's operating personnel. Operator instruction during normal working hours shall be performed by competent representatives familiar with the installed system.
- B. At a time mutually agreed upon with the Owner's Representative, the Control Contractor shall give (20) hours of instructions to the Owner's designated personnel on the operation of all equipment in the system and describe its intended use.
- C. An Owner's manual, prepared for the project by the Control Contractor be used during instruction. Three (3) copies of the Owner's manual shall be provided to the Owner's Representatives a minimum of three weeks prior to training.
- D. All product documentation including operator user manuals and product data shall be provided on CD-ROM.

### 3.8 SEQUENCES OF OPERATION

- A. Variable Volume Terminal Unit W/Reheat:
  - 1. Primary Damper: Room temperature sensor, with override push button, will modulate the primary air damper from the maximum position to the minimum position as required to maintain the space setpoint.
  - 2. Cooling: The unit mounted electric reheat coil shall be deactivated. The primary air damper shall be modulated from the maximum position to the minimum position as required to maintain the space cooling setpoint. If the room subcools below the heating setpoint, the primary air damper shall be maintained in the minimum position and the electric heating coil controls will regulate the heating output to maintain room temperature.
  - 3. Heating: The primary air damper shall be maintained in the minimum position during and the electric heating coil controls will regulate the heating output to maintain the space heating setpoint.
  - 4. Provide discharge air temperature sensor for each unit.
- B. Existing Terminal Reheat Units:
  - 1. The existing terminal reheat unit temperature controls will be upgraded to DDC where indicated. Provide DDC control via space sensor and interface with the existing heating coil controls valves to provide required space heating.
- C. Alarms:
  - 1. Provide control unit alarming function for indicating controller malfunctions and loss of power for all EMS control units.



2. Provide high and low temperature alarm limits for all sensed temperatures. Some examples are as follows:
  - a. Space (Occupied)
    - High: More than 3°F (adjustable) above setpoint.
    - Low: More than 3°F (adjustable) below setpoint.
  - b. Space (Unoccupied)
    - High: Above 85°F (adjustable)
    - Low: Below 55°F (adjustable)
3. Provide additional alarms as required, specified or shown.
4. Each alarm shall have a corresponding programmed message to the operator which shall be displaced immediately and repeated four times per hour unit acknowledged.

D. Manual Override:

1. One override pushbutton will be provided at each temperature sensor.
2. On a signal from the override pushbutton, index the software to reverse the operating mode of unit being overridden (ie., if designated unit is in unoccupied mode, single from pushbutton reverses the unit and particular zone to occupied mode).
3. Manual override signal shall override present operating mode of unit or zone for a period of four (4) hours (adjustable); after such time the controller shall return all override signals back to normal programmed control.

3.9 START-UP AND COMMISSIONING DDC SYSTEM (BMS)

- A. Prior to installing the database and energy management strategies into the and before starting-up the system, the BMS contractor shall have presented a complete scope and outline of such strategies to the Owner for his written approval.
- B. The contractor shall be required to provide not less than 25 hours of time within the first twelve months subsequent to the completion of the installation work to be used in working together with the owner in fine-tuning the EMS strategies that were developed and installed in the BMS prior to initial start-up. The Contractor shall be required to provide any modifications to the initial programming as necessary to have the building HVAC equipment operate in satisfactory and safe fashion and the interior environment remain satisfactory during the various daily building operating modes as deemed acceptable to the Owner.
- C. The Contractor shall secure written acknowledgment of the completion of the initial installation work and the completion of the post installation fine-tuning work from the Owner.

### 3.10 PERSONNEL TRAINING

#### A. Training:

1. Provide start-up, operation and service training for all installed equipment to the Owner's personnel who will be responsible for the operation of the equipment.
2. All training shall be video recorded and stored on DVD, to be turned over to Owner. Obtain receipt.
3. Upon completion of training, provide a record of completed training to the Owner.

#### B. Specific Training Requirements:

1. Provide specific training per the following schedule: Total Training Hours:  
2 Classroom sessions, 4 hours each.  
3 Hands-on training sessions, 4 hours each.

END OF SECTION 230923

## SECTION 233100 – DUCTWORK

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Metal and flexible ductwork.
- B. Duct cleaning.

#### 1.2 REFERENCES

- A. ASHRAE - Handbook Fundamentals; Chapter 33 - Duct Design.
- B. ASHRAE - Handbook Equipment; Chapter 1 - Duct Construction.
- C. ASTM A 90 - Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.
- D. ASTM A 167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- E. ASTM A 525 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
- F. ASTM A 527 - Steel Sheet, Zinc-Coated (Galvanized) by Hot-Dip Process, Lock Forming Quality.
- G. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
- H. NFPA 90B - Installation of Warm Air Heating and Air Conditioning Systems.
- I. SMACNA - Metal and Flexible HVAC Duct Construction Standards.
- J. UL 181 - Factory-Made Air Ducts and Connectors.

#### 1.3 DEFINITIONS

- A. Duct Sizes: Inside clear dimensions. For lined ducts, maintain sizes inside lining.
- B. Low Pressure: Three pressure-velocity classifications: 1/2 inch WG positive or negative static pressure and velocities less than 2,000 fpm; 1 inch WG positive or negative static pressure and velocities less than 2,500 fpm and 2 inch WG positive or negative static pressure and velocities less than 2,500 fpm. All low pressure ductwork shall be constructed to the 2 inch WG pressure-velocity classification.

- C. Medium Pressure: Three pressure classifications: 3-inch WG positive or negative static pressure and velocities less than 4,000 fpm, 4-inch WG positive static pressure and velocities greater than 2,000 fpm, 6 inch WG positive static pressure and velocities greater than 2,000 fpm.
- D. High Pressure: Two pressure classifications: 8 inch WG positive static pressure and velocities greater than 2,000 fpm, 10 inch WG positive static pressure and velocities greater than 2,000 fpm.

#### 1.4 QUALITY ASSURANCE

- A. SMACNA: Gages of materials, fabrication, reinforcement, sealing requirements, installation, and method of supporting ductwork shall be in accordance with the SMACNA HVAC Duct Construction Standards manuals.
- B. Installation shall be by contractor with SMACNA certified training.

#### 1.5 REGULATORY REQUIREMENTS

- A. Construct ductwork to NFPA 90A and NFPA 90B standards.

#### 1.6 SUBMITTALS

- A. Submit 1/4"=1' - 0" SCALE shop drawings and product data.
- B. Indicate duct fittings, particulars such as gages, sizes, welds, and configuration prior to start of Work for all systems.
- C. Ductwork detail drawings.
  - 1. 1/4" scale or larger.
  - 2. Incorporate dimensions of actual equipment supplied.
  - 3. Show adequate sections, elevations and plan views.
  - 4. Detail wall, floor, ceiling and roof penetrations.
  - 5. Show interface and spatial relationship between ductwork and connected equipment.
  - 6. Indicate clearances required for installing and maintaining insulation.
  - 7. Indicate all required duct accessories.
  - 8. Indicate ductwork and ceiling elevation above floor in each room.
  - 9. Note any deviations from Contract Drawings.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. General: Non-combustible or conforming to requirements for Class 1 air duct materials, or UL 181.
- B. Steel Ducts: ASTM A525 or ASTM A527 galvanized steel sheet, lock-forming quality. Ductwork shall have a minimum G60 coating, except for exterior unpainted ductwork and condenser water sump, which shall have a G90 coating.
- C. Insulated Flexible Ducts:
  - 1. Flexible duct wrapped with flexible glass fiber insulation, enclosed by seamless aluminum pigmented plastic vapor barrier jacket; maximum 0.23 K value at 75°F.
  - 2. Manufacturer's product shall meet Underwriters Laboratories Spec. UL181 and NFPA 90A, flame spread 25, smoke developed 50.
  - 3. Insulation shall be 1½", 3/4# density fiberglass blanket, rated for up to 6" S.P. positive, 6,000 FPM, ½" S.P. negative.
  - 4. Provide certification that materials used have been tested and listed by the Building Code of New York State regarding Toxicity/Combustion testing standards.
  - 5. Acceptable Manufacturers: Owens Corning "Fiberglas Valuflex", Thermaflex, Genflex SLR.
- D. Stainless Steel Ducts: ASTM A167, Type 316, in gages and with reinforcing per SMACNA equivalent construction standards
- E. Fasteners: Rivets, bolts, or sheet metal screws.
- F. Sealant: Non-hardening, water resistant, fire resistive, compatible with mating materials; liquid used alone or with tape, or heavy mastic. Tapes shall not be used to seal joints. Sealant equal to Iron Grip IG-601 or accepted equal.
- G. Hanger Rod: Galvanized steel, stainless steel, or aluminum; threaded both ends, threaded one end, or continuously threaded.

### 2.2 LOW PRESSURE DUCTWORK (FABRICATION)

- A. Fabricate and support ductwork and provide duct material, gages, reinforcing and sealing in accordance with SMACNA Metal and Flexible HVAC Duct Construction Standards and ASHRAE handbooks. All ductwork shall be constructed to the 2" WG/2500 fpm pressure-velocity classification, except upstream of variable volume boxes, where the 10" WG pressure-velocity classification is applied. All ductwork shall receive Class A sealant, regardless of SMACNA requirements.

- B. All rectangular ductwork shall be in accordance with the latest SMACNA Standards with regard to; duct gage thickness, reinforcement spacing, bracing, and hangers and supports. All longitudinal seams shall be made with a Pittsburgh Lock (Type L-1) or SMACNA equivalent. Transverse joints on ducts over 14" shall be made with the Ductmate, Ward or Nexus ductwork connection system. Transverse joints on ductwork smaller than 14" may be made with slip and drive joint or SMACNA equivalent.
- C. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts. No variation of duct configuration or sizes permitted except by written permission.
- D. Construct T'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 are used, provide air foil turning vanes. Where acoustical lining is indicated, provide turning vanes of perforated metal with glass fiber insulation.
- E. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible. Divergence upstream of equipment shall not exceed 30 degrees; convergence downstream shall not exceed 45 degrees.
- F. Provide easements where low pressure ductwork conflicts with piping and structure. Where easements exceed 10 percent duct area, split into two ducts maintaining original duct area.
- G. Connect flexible ducts to metal ducts with draw bands, adhesive plus sheet metal screws. Metal collars shall be used where flexible ducts are connected to metal ducts and shall be a minimum of 2" in length.
- H. Dissimilar Metals: Separate dissimilar metals used for ductwork with 12 oz. Vinyl coated woven fiberglass duct connector fabric, such as Duro Dyne's Glasseal. No separation is required between screws or rivets and the materials in which they are inserted.
- I. Round ductwork shall be spiral construction.
- J. Sealant: Non-hardening, water resistant, fire resistive, compatible with mating materials; liquid, mastic, gaskets, or mastic embedded fabric. Tapes shall not be used to seal joints. Sealant equal to Iron Grip 1G-601 or accepted equal.
- K. Where duct is internally acoustically lined maintain inside sizes shown.
- L. Provide standard 45 degree lateral wye takeoffs unless otherwise indicated.

## 2.3 SPIRAL DUCTWORK AND FITTINGS IN LOW PRESSURE SYSTEMS

### A. General:

1. All round and/or flat oval spiral duct and fittings shall be manufactured by a company whose primary business is the manufacture of spiral duct and fittings and who has been in business for at least ten (10) years. All spiral duct and fittings shall be manufactured by the same firm and shall be as shown on the Contract Drawings.
2. All spiral duct and fittings shall be manufactured from G-60 galvanized steel meeting ASTM A924 and A653 requirements.

### B. Construction:

1. Branch connections shall be made with 90 degree conical and 45 degree straight taps as shown on the drawings. All branch connections shall be made as a separate fitting. Factory or field installation of taps into spiral duct shall not be allowed without written approval of the Engineer. Manufacturer's published individual fitting performances shall be on file with the Engineer ten (10) days prior to bid.
2. 90 degree and 45-degree elbows in diameters 3-inch round through 10-inch round shall be stamped or pleated elbows. All other elbows shall be of the gored type, fabricated in accordance with the following:

<u>Centerline radius</u>	<u>Elbows less than 30°</u>	<u>Elbows 37° thru 71°</u>	<u>Elbows 72° thru 90°</u>
Up to 1000 fpm 1.0 × diameter	2 gores	2 gores	3 gores
1001 to 1500 fpm 1.0 × diameter	2 gores	3 gores	4 gores
Above 1500 fpm 1.5 × diameter	2 gores	3 gores	5 gores

Where it is necessary to use two-piece elbows, they shall have a minimum number of vanes in accordance with the following:

<u>Duct diameter</u>	<u>No. of vanes</u>
3-inch thru 9-inch	2
10-inch thru 20-inch	3
21-inch and up	5

3. Circumferential and longitudinal seams of all fittings shall be a continuous weld or spot-welded and sealed with mastic. All welds shall be painted to prevent corrosion.
4. All field joints for round ducts up to and including 36-inch diameter and oval ducts up to and including 41-inch major axis shall be made with a 2-inch slip-fit or slip coupling. Diameters 38-inches round and larger shall be provided with AccuFlange, or equal, flanged connections. AccuFlange, or equal, flanged connections may also be used in lieu of slip connections on smaller sizes.
5. All flanges and access doors shall be factory-installed. Shipments of loose flanges, access doors, or taps for field installation into spiral duct will not be allowed.

C. Metal Gauges for Single Wall Ductwork:

1. Metal gauges for single wall round ducts shall be as follows:

a. Round ducts with maximum 2-inch w.g. positive static pressure

Duct diameter	Fittings and Spiral duct	longitudinal seam duct
3-inch thru 26-inch	26	24
28-inch thru 36-inch	24	22
38-inch thru 50-inch	22	20
52-inch thru 60-inch	20	18
62-inch thru 78-inch	18	16

b. Round ducts with maximum –2-inch w.g. negative static pressure

Duct diameter	Spiral duct	Fittings and longitudinal seam duct
3-inch thru 17-inch	26	24
18-inch thru 20-inch	24	22
21-inch thru 22-inch	24	20
24-inch thru 26-inch	22	20
28-inch thru 30-inch	22	18
32-inch thru 34-inch	20	18
36-inch thru 42-inch	20	16
44-inch thru 48-inch	20	18 (notes 1 & 3)
50-inch thru 60-inch	18	18 (notes 2 & 3)

Notes:

- 1) Reinforce with 2-inch × 1-inch × 1/8-inch girth rings every 6 feet.
- 2) Reinforce with 1-1/4-inch × 1-1/4-inch × 6/16-inch girth rings every 4 feet.
- 3) When companion flange joints are used as reinforcement, 44-inch to 48-inch diameter shall be 2-inch × 2-inch × 3/16-inch 50-inch to 60-inch diameter shall be 2-1/2-inch × 2-1/2-inch × 3/16-inch

2.4 MEDIUM AND HIGH-PRESSURE DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA Duct Construction Standards and ASHRAE handbooks, except as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated. Ductwork shall receive class A sealant, regardless of SMACNA requirements
- B. All medium pressure ductwork indicated on the contract drawings shall be constructed to the 6" WG pressure-velocity classification.



- C. All high-pressure ductwork indicated on the contract drawings shall be constructed to the 10" WG pressure-velocity classification.
- D. Transform duct sizes gradually, not exceeding 15 degrees divergence and 30 degrees convergence.

## 2.5 SPIRAL DUCTWORK AND FITTINGS IN MEDIUM PRESSURE SYSTEMS

### A. General

- 1. All round and/or flat oval spiral duct and fittings shall be manufactured by a company whose primary business is the manufacture of spiral duct and fittings and who has been in business for at least ten (10) years.  
All spiral duct and fittings shall be manufactured by the same firm and shall be as shown on the Contract Drawings.
- 2. All spiral duct and fittings shall be manufactured from G-60 galvanized steel meeting ASTM A924 and A653 requirements.

### B. Construction

- 1. Branch connections shall be made with 90 degree conical and 45 degree straight taps as shown on the drawings. All branch connections shall be made as a separate fitting. Factory or field installation of taps into spiral duct shall not be allowed without written approval of the Engineer. Manufacturer's published individual fitting performances shall be on file with the Engineer ten (10) days prior to bid.
- 2. All elbows shall be fabricated with a centerline radius of 1.5 times the diameter. 90 degree and 45-degree elbows in diameters 3-inch round through 10-inch round shall be stamped or pleated elbows. All other elbows shall be of the gored type, fabricated in accordance with the following:

Degree of elbow	No. of gores
less than 36 degree	2
37 thru 71 degree	3
72 thru 90 degree	5

Where it is necessary to use two-piece mitered elbows, they shall have a minimum number of vanes in accordance with the following:

Duct diameter	No. of vanes
3-inch thru 9-inch	2
10-inch thru 20-inch	3
21-inch and up	5

- 3. Circumferential and longitudinal seams of all fittings shall be a continuous weld or spot-welded and sealed with mastic. All welds shall be painted to prevent corrosion.

4. All field joints for round ducts up to and including 36-inch diameter and oval ducts up to and including 41-inch major axis shall be made with a 2-inch slip-fit or slip coupling. Diameters 38-inches round and larger shall be provided with AccuFlange, or equal, flanged connections. AccuFlange, or equal, flanged connections may also be used in lieu of slip connections on smaller sizes.
5. Access doors shall be supplied by the duct manufacturer at all fire and/or smoke dampers.
6. All flanges and access doors shall be factory-installed. Shipments of loose flanges, access doors, or taps for field installation into spiral duct will not be allowed.
7. All flat oval ducts shall be reinforced with trapeze type reinforcement, as recommended by the manufacturer, to limit wall deflection to 3/4-inches and reinforcement deflection to 1/4-inches.

C. Metal Gauges for Single Wall Ductwork

1. Metal gauges for single wall round and flat oval ducts shall be as follows:

- a. Round ducts for positive pressure up to +4-inch w.g.

Duct diameter	Spiral duct	Fittings and longitudinal seam duct
3-inch thru 16-inch	26	24
17-inch thru 18-inch	24	24
19-inch thru 22-inch	24	22
24-inch thru 26-inch	24	22
28-inch thru 36-inch	22	20
38-inch thru 50-inch	20	20
52-inch thru 60-inch	18	18
62-inch thru 78-inch	18	16

- b. Round ducts for positive pressure up to +10-inch w.g.

Duct diameter	Spiral duct	Fittings and longitudinal seam duct
3-inch thru 14-inch	26	24
15-inch thru 26-inch	24	22
28-inch thru 36-inch	22	20
38-inch thru 50-inch	20	20
52-inch thru 60-inch	18	18
62-inch thru 78-inch	18	16

2.6 PLENUMS

- A. Fabricate plenums in accordance with SMACNA Metal and Flexible HVAC Duct Construction Standards. Solder joints watertight.

## 2.7 DUCTWORK SUPPORT MATERIALS

- A. Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim and angles for support of ductwork.
- B. For exposed stainless-steel ductwork, provide stainless steel support materials.

## 2.8 ACOUSTICAL DUCT LAGGING

- A. Foil-faced loaded vinyl barrier bonded to a 2" thick scrim faced quilted fiberglass absorber. Nominal thickness 2.0 inches, weight 1.3 psf, "R" Factor 9.0, Flammability Smoke Density index 19.5, Flame spread index 12.5, Temperature range -20° □to +200°F. Manufacturer/Model: Sound Seal/B10LAG/QFA-9."

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install ductwork to allow maximum headroom. Properly seam, brace, stiffen, support and render ducts mechanically airtight.
- B. Provide necessary transformation pieces, and flexible fabric connections for ductwork connected to all air handling equipment.
- C. Provide volume dampers at every branch take off and to each air outlet.
- D. Provide smoke and fire dampers as required by code, and as shown.
- E. Flexible ductwork is not permitted, except at final connections to diffusers (maximum length five feet). Flexible ductwork shall not be used where misalignment of ducts and outlets occur.
- F. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
- G. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- H. Connect diffusers or troffer boots to low pressure ducts with 5 feet maximum length of flexible duct. Hold in place with strap or clamp.
- I. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

### 3.2 SEALING SEAMS, JOINTS, AND PENETRATIONS

- A. Seal ductwork in accordance with the SMACNA Manual. Low pressure ductwork to be seal Class A. Medium pressure ductwork to be seal Class A. Leakage of system to be a maximum of 5%.
- B. Use liquids, mastics, gaskets, or mastic embedded fabric. Tapes shall not be used to seal joints.

### 3.3 DUCTWORK APPLICATION SCHEDULE

AIR SYSTEM	MATERIAL
Low Pressure Supply, Return and General Exhaust	Galvanized Steel
Fume Hood Exhaust	316 Stainless steel, all joints welded

### 3.4 DUCTWORK SUPPORTS

- A. Hangers, Rectangular Ducts: Ducts with semi-perimeter of up to 30", provide 1" x 22 ga. strap. Semi-perimeter of up to 72", provide 1" x 18 ga. strap. Ducts with semi-perimeter greater than 72", provide trapeze hanger with all thread rod. All above as per SMACNA Standards.
- B. Hangers, Round Duct: Ducts up to 24" diameter, provide 1" x 22 ga. strap hangers. Ducts up to 36" diameter, provide 1" x 20 ga. strap hangers. Ducts larger than 36" diameter, provide two 3/8" rod hangers with (2) 1" x 18 ga. straps around duct. The above as per SMACNA Standards.

### 3.5 ADJUSTING AND CLEANING

- A. Clean duct systems with high power vacuum machines. Protect equipment that may be harmed by excessive dirt with filters, or bypass during cleaning. Provide adequate access into ductwork for cleaning purposes.

END OF SECTION 233100

## SECTION 233300 – DUCTWORK ACCESSORIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Volume control dampers.
- B. Fire dampers
- C. Air turning devices.
- D. Duct access doors.
- E. Duct test holes.

#### 1.2 REFERENCES

- A. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
- B. SMACNA - Low Pressure Duct Construction Standards.
- C. UL 33 - Heat Responsive Links for Fire-Protection Service.
- D. UL 555 - Fire Dampers and Ceiling Dampers.

#### 1.3 SUBMITTALS

- A. Submit shop drawings and product data.
- B. Submit manufacturer's installation instructions.

### PART 2 - PRODUCTS

#### 2.1 VOLUME CONTROL DAMPERS.

- A. Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards, and as indicated.
- B. Splitter dampers: Not permissible.
- C. Fabricate single blade dampers for duct sizes to 11 x 24 inch.

- D. Fabricate multi-blade damper of opposed blade pattern with maximum blade sizes 12 x 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
- E. Provide locking, indicating quadrant regulators on single and multi-blade dampers. Where rod lengths exceed 30 inches provide regulator at both ends.
- F. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.

## 2.2 FIRE DAMPERS

- A. Fabricate in accordance with NFPA 90A and UL 555, NFPA 101 and as indicated. All fire dampers shall be UL listed for the application. Dampers shall be 1-1/2 hour rated 80% free area. Provide 3 hour rated dampers when application is for use in areas with a construction rating greater 2 hours such as stairway etc.
- B. Fabricate curtain type dampers of galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations. Configure with blades out of air stream.
- C. Fabricate multiple blade fire dampers with 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.
- D. Makes: Ruskin, Prefco, Air Balance.
- E. Design Make: Ruskin or accepted equal.

## 2.3 AIR TURNING DEVICES

- A. Multi-blade device with blades aligned in short dimension; steel or aluminum construction; with individually adjustable blades, mounting straps.

## 2.4 DUCT ACCESS DOORS

- A. Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards and as indicated.
- B. Review locations prior to fabrication.
- C. Fabricate rigid and close-fitting doors of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ductwork, install minimum one inch thick insulation with sheet metal cover.
- D. Access doors smaller than 12 inches square may be secured with sash locks.

- E. Provide two hinges and two sash locks for sizes up to 18 inches square, three hinges and two compression latches with outside and inside handles for larger sizes. Provide an additional hinge for larger sizes.
- F. Access doors with sheet metal screw fasteners are not acceptable.

## 2.5 DUCT TEST HOLES

- A. Cut or drill temporary test holes in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
- B. Permanent test holes shall be factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

## 2.6 FLEXIBLE DUCT CONNECTIONS

- A. Fabricate in accordance with SMACNA low pressure duct construction standards.
- B. UL listed fire-retardant neoprene coated woven glass fiber fabric, per NFPA 90A, minimum density 36 oz. per sq. yd., approximately 6" wide, crimped into metal edging strip.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions.
- B. Provide balancing dampers at points on low pressure supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing.
- C. Provide fire dampers at locations indicated and where ducts and outlets pass through fire rated walls and where required by authorities having jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges. Install per UL and NFPA.
- D. Demonstrate re-setting of fire dampers and smoke dampers to authorities having jurisdiction and Owner's Representative.
- E. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, and elsewhere as indicated. Provide minimum 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, and as indicated.

- F. Provide duct test holes were indicated and required for testing and balancing purposes.

END OF SECTION 233300



## SECTION 233600 – AIR TERMINAL UNITS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Single Duct Variable Volume Boxes.
- B. Variable Volume Regulators.
- C. Sound Attenuator.
- D. Integral Damper Motor Operators.
- E. Reheat Coils.
- F. Controls.

#### 1.2 REFERENCES

- A. ARI - Standard 880-809.
- B. ADC 1062 - Air Distribution and Control Device Test Code.
- C. NFPA 70 - National Electrical Code.
- D. NFPA 90A - Installation of Air Conditioning and Ventilation Systems.
- E. UL 181 - Factory-made air ducts and connectors.

#### 1.3 PERFORMANCE TOLERANCES

- A. Base performance on tests conducted in accordance with ADC 1062.

#### 1.4 SUBMITTALS

##### A. Shop Drawings and Product Data

1. Shop Drawings: Indicate configuration, general assembly, and materials used in fabrication, and electrical characteristics and connection requirements.
2. Product data: Provide data indicating configuration, general assembly, and materials used in fabrication. Include catalog performance ratings which indicate air flow, static pressure, and NC designation. Include electrical characteristics and connection requirements.

##### B. Schedules of Equipment and Enclosures: Including discharge and radiated source power level for each of second through sixth octave bands at inlet static pressures of one to 4 inches WG.

##### C. Wiring Diagrams: Include manufacturer's electrical requirements for power supply wiring to terminal units and ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.

##### D. Manufacturer's Installation Instructions: Indicate support and hanging details, and service clearances required.

##### E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings. Include directions for resetting constant volume regulators.

#### 1.5 QUALIFICATIONS

##### A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum five years experience.

##### B. Meets internal insulation requirements - NFPA 90A, UL181.

#### 1.6 REGULATORY REQUIREMENTS

##### A. Tested in accordance with ARI Standard 880-89 and carry ARI Seal.

##### B. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., as suitable for the purpose specified and indicated.

#### 1.7 DELIVERY, STORAGE AND HANDLING

##### A. Deliver products to site.

##### B. Store products in a clean dry place.

- C. Protect units from weather, dirt, fumes, water, construction debris and physical damage by storing in protected areas and leaving factory covers in place.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. Provide products in locations as indicated, and of capacities, style and having accessories as scheduled on the contract drawings or as specified herein.
- B. Manufacturer to provide catalogued performance ratings which conforming to CFM, static pressure, discharge and radiated sound power and attenuation.
- C. Manufacturers: Price SDR (Design Make), Trane, Carrier, Carnes, Titus, Tempmaster.

### 2.2 MANUFACTURED UNITS

- A. Ceiling mounted, pressure independent, variable air volume, supply air control terminals for connections to single duct, central air systems, with electric variable volume controls and electric heating coils.
- B. Identify each terminal unit with clearly marked identification label and air flow indicator. Include unit nominal air flow, maximum factory set airflow, minimum factory set air flow, and coil type.

### 2.3 VARIABLE AIR VOLUME TERMINAL UNITS

- A. General: Factory-assembled, single duct, ceiling mounted, pressure independent, externally powered, variable air volume control terminal. Unit shall be complete with a damper assembly, flow sensor, externally mounted volume controller, collars for duct connection and all required features. Control box shall be clearly marked with an identification label that lists such information as nominal cfm, maximum and minimum factory-set airflow limits, coil type and coil hand, where applicable.
- B. Unit Cabinet:
  - 1. Constructed of 22-gage galvanized as indicated on drawings steel with round, rectangular or flat oval inlet collar and rectangular discharge with slip and drive connection.
  - 2. Insulated with 1/2-inch, 1.5 lb. equivalent density mat-faced insulation.

- C. Damper Assembly: The damper assembly shall be composed of multiple 16-gage damper blades located in a 16-gage damper frame, utilizing steel damper linkages and mounted on nylon self lubricating blade bearings. Dampers shall have an open cell foam damper seal affixed to the blade, providing a maximum of 2% of the maximum rated capacity with dampers closed with an inlet pressure of 3 in. WG. Damper assembly will consist of either 4 or 6 blades with a 90 degree travel, and shall provide uniform air delivery over the entire face of the unit at all flows.
- D. Sound Attenuator: Provide sound attenuators where indicated.
- E. Electric Actuator: 24 volt, reversible type.
- F. Velocity Probe:
  - 1. Pneumatic.
  - 2. Calibration pressure taps for pressure independent control to compensate for varying inlet static pressure.
- G. Wiring: Factory mount and wire controls. Mount electrical components NEMA-1 control box with removable cover. Incorporate single point electrical connection to power source.
- H. Provide terminal strip in control box for field wiring of power source.
- I. Provide factory wired disconnect switch.
- J. The VAV box controller shall be provided by the DDC manufacturer for factory mounting by the VAV box manufacturer. This controller shall accomplish the following:
  - 1. Maximum and minimum limits.
  - 2. Maintain air flow within 5% of set point with inlet static pressure variation up to 2 inches.
  - 3. Damper shall modulate to satisfy room sensor input.
  - 4. Provide output for modulating control of re-heat valve.

## 2.4 ELECTRIC HEATING COIL

- A. UL Listed Ni-Chrome element, high temperature Limits, airflow switch, integral disconnect, proportional SSR heater control.
- B. Provide magnetic contactors and control transformer.
- C. Provide factory wired disconnect switch.
- D. Capacity: As scheduled

## 2.5 TESTS

- A. Test Run Volume Dampers and Controls. Check at factory prior to shipment.
- B. Base performance on tests conducted in accordance with ADC 106.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide ceiling access doors on units located above easily removable ceiling components.
- C. Support units individually from structure. Do not support from adjacent ductwork.
- D. Connect to ductwork in accordance with Section 23 3100.
- E. Provide minimum of 5 ft long, 2-inch-thick lined ductwork downstream of units.

### 3.2 ADJUSTING

- A. Reset volume with damper operator attached to assembly allowing flow range modulation from 100 percent of design flow to the scheduled minimum flow.

END OF SECTION 233600

## SECTION 233700 – AIR OUTLETS AND INLETS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Diffusers
- B. Registers/grilles

#### 1.2 REFERENCES

- A. AMCA 500 - Test Method for Dampers and Shutters.
- B. ANSI/NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
- C. ARI 650 - Air Outlets and Inlets.
- D. ASHRAE 70 - Method of Testing for Rating the Air Flow Performance of Outlets and Inlets.
- E. SMACNA - Low Pressure Duct Construction Standard.

#### 1.3 SUBMITTALS

- A. Provide product data for items required for this project.
- B. Submit schedule of outlets and inlets indicating type, size, location, application, and noise level.
- C. Review requirements of outlets and inlets as to size, finish, and type of mounting prior to submitting product data and schedules of outlets and inlets.

#### 1.4 QUALITY ASSURANCE

- A. Test and rate performance of air outlets and inlets in accordance with ADC Equipment Test Code 1062 and ASHRAE 70.
- B. Conform to NSI/NFPA 90A.

#### 1.5 REGULATORY REQUIREMENTS

- A. Conform to ANSI/NFPA 90A.

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS - GRILLES AND REGISTERS

- A. Carnes
- B. Tuttle & Bailey
- C. Titus
- D. Design Make: Titus
- E. Or accepted equal.

### 2.2 GENERAL

- A. Provide mounting frames where required.
- B. See schedule on Drawings for diffuser and register types.
- C. Provide air inlets and outlets sized for less than NC-30 rating at all locations.

### 2.3 GRILLES AND REGISTERS

- A. Fabricate grille and register faces, and frames of steel with factory applied white baked enamel finish. Training pool replacement units to be aluminum.
- B. See schedule on Drawing for each type and details of construction.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install items in accordance with manufacturer's instructions.
- B. Check location of outlets and inlets and make necessary adjustments in position to conform 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, regardless of whether dampers are specified as part of the diffuser, or grille and register assembly.

END OF SECTION 233700



## SECTION 260000 - GENERAL REQUIREMENTS FOR DIVISION 26

### PART - GENERAL

#### 1.1 BID AND CONTRACT DOCUMENTS

- A. All Work in this Division is subject to the provisions of the General Conditions, Supplementary General Conditions and Requirements of Division 1 General Requirements and Division 2 Site Work.
- B. By submitting the bid, the Contractor acknowledges that he has not received any verbal directives from the Owner, Architects and Engineers (and their employees and sub-consultants) at any time before, during or after the bid. He further acknowledges that he has verified with all his sub-contractors, suppliers, vendors, and their representatives that they have not received any verbal directives from the Owner, Architects and Engineers (and their employees and sub-consultants) at any time before, during or after the bid. The Contractor further acknowledges that all changes to the bid documents have been only in the form of formal addendum.
- C. By starting Work on this project, the Contractor acknowledges that all directives, field orders and change order will be only from the Owner or his Designated Representative and only in writing. All other directives verbal or otherwise will be at the Contractor's own risk.

#### 1.2 SCOPE OF WORK

- A. The scope of this Work includes lighting, power and communications systems for the project as indicated on the Contract Documents, including, but not limited to the following:
  - 1. Removal of existing electrical equipment as indicated on Drawings.
  - 2. Reuse existing electric service and power distribution system for temporary power for construction purposes.
  - 3. Lighting, power and communications systems for the alterations and areas shown.
  - 4. Wiring devices and branch circuitry in areas shown.
  - 5. Power wiring systems for mechanical and miscellaneous electrical equipment.
  - 6. Raceway system for telephone and data cabling.
  - 7. Fire Alarm System.
  - 8. Entrance control system.
  - 9. All necessary cutting, patching and firestopping.
  - 10. Miscellaneous items shown and/or specified.

B. Electrical System Protective Device Study:

1. The Contractor is responsible to prepare a short circuit and overcurrent coordination analysis to determine the distribution system equipment (circuit breakers/fuses) and their associated trip types (full electronic, combination electronic thermal or thermal only) of all devices in the power system to achieve system coordination as required by the NEC. The analysis must be submitted and approved prior to the submission of any power equipment, as these cannot be reviewed and approved until proper equipment has been determined. The Contractor's failure to submit a timely analysis and obtain approval of same shall not be a basis for any delay claim.
2. Graphically illustrate on log-log paper that adequate time separation exists between devices. Sufficient curves shall be used to clearly indicate the coordination achieved between devices. Reasonable coordination intervals and separation of characteristic curves shall be maintained. Plot the specific time-current characteristics of each protective device in such a manner that the upstream devices will be clearly depicted on the sheet.
3. The plots shall include complete titles, representative one-line diagram and legends, associated Power Company's relays or fuse characteristics, and complete parameters of transformers. There shall be a maximum of eight protective devices per sheet.

1.3 NEW YORK STATE LICENSE

- A. The Division 26 Contractor shall possess a license to specifically install fire alarm and security systems, on those projects involving fire alarm or security system work.

1.4 PERMITS AND INSPECTIONS

- A. Inspection Certificate: A third party independent electrical inspection and certificate is required. The independent electrical inspector shall be certified by the International Association of Electrical Inspectors. The Contractor shall submit certificate prior to application for final payment. Acceptable inspection agencies include:
1. Commonwealth Electrical Inspection Service, Inc. (585-624-2380).
  2. Independent Consolidated Electrical Inspection Service, Inc. (315-735-5233).
  3. Middle Department Inspection Agency, Inc. (MDIA) (315-337-3480).
  4. New York Atlantic-Inland, Inc. (315-843-5155).
  5. The Inspector, LLC (315-247-9162).
- B. Permits: Contractor shall acquire all required permits required for execution of the Work of this Division and shall pay all fees and charges for same.

## 1.5 CODES AND STANDARDS

- A. International Building Code: Provide all Work in compliance with and meet the requirements of the latest issue.
- B. National Electrical Code: All Work covered under these Contract Documents shall conform to the latest issue of the National Electrical Code.
- C. Standards: All equipment shall meet all the requirements of ANSI, NEMA, IES and IEEE standards.
- D. Listing: All equipment and devices for which Underwriters' Laboratory has a listing service, shall be UL listed and bear the UL listing label.
- E. All materials and installation shall comply with:
  - 1. International Building Code.
  - 2. International Energy Conservation Construction Code.
  - 3. International Fire Code.
  - 4. International Mechanical Code.
  - 5. National Fire Protection Association (NFPA).
  - 6. New York State Department of Labor Rules and Regulations.
  - 7. The Americans with Disabilities Act
  - 8. Local Utilities.
  - 9. Authorities having jurisdiction.
  - 10. Federal and State Occupational Safety and Health Administration

## 1.6 LOCAL AUTHORITY HAVING JURISDICTION (AHJ)

- A. This Document does not supersede any Code, local or otherwise. All Contractors must be aware of any local requirements and Codes that may affect this project. The AHJ will make all final decisions concerning all code interpretations. Any discrepancies must be reported to the Architect or Engineer within 24 hours. Any code violations are the responsibility of the Contractor and the Contractor shall promptly make all required corrections.

## 1.7 DEFINITIONS

- A. "Engineer" shall mean RAM-TECH Engineers, P.C.
- B. "Accepted" means written permission to use a material or system.
- C. "Provide" shall mean to deliver to installation site, install, and connect complete and make operational.
- D. "Furnish" means to supply and deliver to site, unload, and set in location determined by Architect.

- E. "Install" means to mount and connect complete and make operational the equipment or device.

## 1.8 SHOP DRAWINGS/SAMPLES

- A. Submit number of copies of Shop Drawings on all items of equipment and materials to be furnished and installed as indicated in Section 01300. Submit in bound brochure form; individual or piecemeal or incomplete submittals will not be accepted.
- B. Submission of Shop Drawings/Samples shall be accompanied by dated transmittal letter, stating name of project and prime professional and contractor, number of data sheets, titles and other pertinent data called for in individual Sections.
- C. Each submittal will be returned to the Contractor stamped or marked as follows:
  - 1. "A" ACTION or "PROVIDE AS SUBMITTED": The Contractor is advised that this means that fabrication, manufacture and/or construction may proceed providing the Work is in compliance with the Contract Documents.
  - 2. "B" ACTION or "PROVIDE AS CORRECTED": The Contractor is advised that this means that fabrication, manufacture and/or construction may proceed providing the Work is in compliance with the marked notations and the Contract Documents. Also, the submittal should be corrected and resubmitted for final distribution.
  - 3. "C" ACTION or "REVISE AND RESUBMIT": The Contractor is advised to revise and resubmit. Product submissions marked with this ACTION or NOTATION will not be permitted on the site.
  - 4. "D" ACTION or "REJECTED": The Contractor is advised that this means no Work shall be fabricated, manufactured and/or constructed and that the Contractor shall make a new submittal for the project. Product submissions marked with this ACTION or NOTATION will not be permitted on the site.
  - 5. Catalog cuts and brochures stamped "A" ACTION or "B" Action, the Contractor shall be responsible for distributing them in the field and to the subcontractors. If the returned Shop Drawings are stamped "C" ACTION or "D" ACTION, the Contractor shall submit new copies of Shop Drawings revised to show compliance.
- D. Shop Drawings check is intended solely for review of general conformance with the design concept and information given in the Contract Documents. Corrections and comments on the Shop Drawings does not relieve the Contractor from compliance with the requirements of the Drawings and Specifications. The Contractor shall be responsible for: conforming and correcting all quantities, checking mechanical characteristics and dimensions, coordinating Division 26 Work with that of other trades and performing all Work in a safe and satisfactory manner.

1.9 QUALITY ASSURANCE

- A. Install all Work true to line and grade, parallel and close to walls and parallel to lines of building and maintaining maximum headroom. Do not install conduit, surface raceway, equipment, etc. across doors, windows or other openings.
- B. All equipment shall be accessible for operation, service, etc.
- C. All equipment and material shall be new, unused and without any defects.

1.10 PROTECTION OF PERSONS AND PROPERTY

- A. Make provisions to prevent moisture and foreign matter from entering conduit, equipment, etc.
- B. Contractor shall be responsible for all damages until Work is fully accepted. Replace all damaged equipment and material.
- C. Assume responsibility for construction safety at all times. Include, as part of contract, all trench or building shoring, scaffolding, shielding, dust protection, mechanical/electrical protection, safety railings, barriers and other safety features required to provide safe conditions for all workmen and site visitors.

1.11 EXAMINATION OF SITE

- A. Examine all Drawings including other Divisions.
- B. Examine all existing conditions and ascertain access to site, available storage and delivery facilities.
- C. Verify all governing dimensions at site and building.

1.12 OBSTACLES, INTERFERENCE AND COOPERATION

- A. Drawings show general design and arrangement. Verify exact location and elevations at the job location. Do not scale plans and diagrams.
- B. Drawings do not show all offsets, fittings, interferences and elevation changes. Adjust installation of conduit, equipment location, etc. to accommodate Work with the obstacles and interferences. Where rearrangement is necessary, report same to Architect for review. Obtain written acceptance for all changes.
- C. Cooperate with all Contractors and Owner and determine the exact route of all conduit, raceway and location of all equipment.

1.13 CONCEALMENT

- A. Unless otherwise specifically indicated, all Work shall be concealed above ceiling space, in wall space, below slabs in crawl spaces and elsewhere throughout the building.
- B. In areas with no ceilings, install only after Architect reviews and comments on arrangement and appearance.

1.14 COORDINATION

- A. Review all construction Drawings and coordinate all Shop Drawings with Work specified under all divisions of the specifications. Division 26 is responsible to coordinate and cooperate with other Divisions' Work so that Work can be installed and maintained substantially as called for.

1.15 OPENINGS, SLEEVES AND CHASES

- A. Certain chases, openings and shafts will be provided as shown as part of General Construction Plans and Specifications.
- B. Provide all other openings and sleeves for conduit, raceways, etc. through floors, walls, partitions, ceilings, roofs, etc. for Division 26 Work.
- C. Assume responsibility for correct and final location and size of such openings: furnish templates if required. Correct improperly located and sized or omitted chases and openings as required. Plug all abandoned sleeves left as part of this Division.

1.16 FLASHING, SEALING AND FIRESTOPPING

- A. Seal where conduit passes through or is affixed to general construction.
- B. Provide flashing, sealing and waterproofing for wall, floor and roof openings without affecting roof guarantee or bond.
- C. Conduit entering through waterproof walls, floors and partitions: Provide Thunderline Corporation "Link-Seal" or accepted substitute for sealing the annular space between the conduit and sleeves.
- D. Provide firestopping for openings through fire and smoke barriers, maintaining minimum required rating of floor, ceiling or wall assembly. Refer to Section 26 05 10.

1.17 CUTTING AND PATCHING

- A. Contractor shall do all cutting and patching of existing surface required for installation of Work installed under this Division.

- B. Repaired surfaces shall match existing surface.
- C. Method of cutting shall be approved by the Architect.
- D. Refer to Section 01045 of General Requirements.

#### 1.18 PAINTING

- A. Prepare surfaces of Work installed under this Division by cleaning, removing rust, etc.
- B. Paint all exposed Work in existing areas to match existing conditions.

#### 1.19 ACCESS PANELS

- A. Provide for all junction boxes and equipment located in concealed spaces.
- B. Access panels shall be UL rated for walls and/or ceilings they are installed in.
- C. Provided complete by General Construction Division at locations required for repair or maintenance and as required by Code. Quantity, location and size shall be the responsibility of this Division.
- D. For non-fire rated walls and ceilings, provide access panel DSC-214M, size as required or as otherwise noted on Drawings, as manufactured by Karp Associates, Inc. or accepted equal.
  - 1. Frame shall be 16-gauge steel.
  - 2. Door shall be 14-gauge steel.
  - 3. Flange of frame shall be one piece construction,  $\frac{3}{4}$  wide, 16-gauge steel.
  - 4. Hinges shall be concealed continuous piano hinge.
  - 5. Locks shall be flush to finished surface of door and shall be key operated cylinder with automatic dust shutter. All locks to be keyed alike.
  - 6. Provide masonry anchor straps or mounting holes for installation in substrates as shown on Drawings.
  - 7. Base metal shall be steel with prime coat of rust inhibitive electrostatic powder baked gray enamel.  
or  
Base metal shall be stainless steel with #4 satin finish.
- E. Comply with manufacturer's instructions for installation of access panels.
- F. Set frames accurately in position and securely attached to supports with face panels plumb or level in relation to adjacent finish surfaces.
- G. Adjust hardware and panels after installation for proper operation.

- H. Remove and replace panels of frames which are warped, bowed or otherwise damaged.

#### 1.20 STORAGE AND PROTECTION OF MATERIALS

- A. Store materials on base, minimum 6" above ground or floor. Equip with waterproof or windproof cover for items subject to moisture damage.
- B. Store in orderly manner so as not to interfere with other Work or obstruct access to buildings or facilities.
- C. Replace items stolen or damaged at no cost to the Owner.

#### 1.21 EQUIPMENT CONNECTIONS

- A. Provide complete conduit connections to all equipment as called for on Drawings and as specified.
- B. Obtain approved roughing diagrams and exact location of equipment for items furnished under other Divisions of the specifications. Do not rough without approved Drawings.

#### 1.22 CONTINUITY OF SERVICE

- A. Building will be used by Owner during the construction period.
- B. Keep all systems operative; make temporary connections as required.
- C. Do not shut off any service without written permission from the Owner.

#### 1.23 TESTS

- A. Perform operations required for the complete testing of all systems, equipment and related Work as called for.
- B. Perform all tests required by local municipalities, utilities, or other governing bodies, boards or agencies having jurisdiction. Contractor shall be responsible to notify the Owner, in writing, at least one (1) week prior to testing. Provide date and time of testing.



1.24 TEMPORARY LIGHT AND POWER

- A. Provide temporary electric system from Owner's existing electric service for lighting and power. Make all necessary arrangements with Owner, through Owner's Site Representative for tie into existing service and ascertain that adequate power is available for temporary service.
- B. Energy shall be paid by the Owner.

1.25 OWNER INSTRUCTIONS

- A. Instruct designated Owner's personnel on the proper operation and care of systems and equipment, before final acceptance of the Work. Obtain written acknowledgement from person instructed prior to final payment. Submit to Architect with final acceptance request.
- B. Prepare three Instruction and Maintenance Manuals, including one copy each of accepted Shop Drawings, wiring diagrams, and spare parts lists and manufacturer's instructions. Include in instructions, description of equipment, starting/operating procedures, emergency operating instructions, precautions and recommended maintenance procedures.
- C. Include name, address and telephone number of supplier manufacturer representative and service agency for all equipment items.
- D. Bind the above in three ring binder with name of project on cover and deliver to Architect for review with request for final acceptance.

1.26 CONTRACTOR'S CERTIFICATION

- A. All submittals shall bear the Contractor's stamp, certifying the review and approval of submittal, verification of field measurements and compliance with Contract Documents. It shall specifically be as follows:

Contractor acknowledges that all items submitted herein are provided for the base Contract Cost; and that he has reviewed the submittal information contained herein; and that he has determined and verified the materials, field measurements and field construction criteria related thereto, and that he has checked and coordinated the information contained in the submittal with the requirements of all Work in the Contract Documents and other Contracts in the Project.

\_\_\_\_\_  
Contractor's Signature

\_\_\_\_\_  
Date

- B. All submittals without the above certification will be returned, rejected.

END OF SECTION 260000

## SECTION 260510 – FIRESTOPPING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes field constructed assemblage of firestopping products and materials for the following:
  - 1. Penetrations through fire-rated floor construction.
  - 2. Penetrations through fire-rated walls and partitions.
  - 3. Penetrations through smoke barriers.

#### 1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM) Publications:
    - E 84: Standard Test Methods for Surface Burning Characteristics of Building Materials.
    - E 119: Methods of Fire Tests of Building Construction and Materials.
    - E 814: Standard Method of Fire Tests of Through-Penetration Fire Stops.
    - C 719: Adhesion and Cohesion of Elastomeric Joint Sealants under Cyclic Movements.
    - C 920: Standard Specification of Elastomeric Joint Sealants.
  - B. Underwriter's Laboratories Inc. (UL) Publications:
    - UL 263: Fire Tests of Building Construction and Materials.
    - UL 723: Surface Burning Characteristics of Building Materials.
    - UL 1479: Fire Tests of Through-Penetration Firestops.
    - UL 2079: Standard for Fire Tests of Joint Systems.
- Underwriters Laboratories "Fire Resistance Directory" (Current Year).

C. Miscellaneous Publications:

1. Factory Mutual Approval Guide (Current Year).
2. Warnock Hersey Certification Listings.

1.3 DEFINITIONS

- A. Fire Rated Assembly: Includes all fire rated walls, floors, floor/ceiling and roof system assemblies. Ratings shall be as per ASTM E 119 or UL 263.
- B. Firestop System: Firestop systems prevent the spread of smoke, fire and toxic gases through openings in the fire rated assemblies or through joints between wall and floor or roof assemblies or other expansion or seismic joints (also known as firesafing), for a specified period of time, incorporating the use of specific products installed in a specific manner.
- C. Flame Spread/Smoke Developed Ratings: Numerical value of a material when tested in accordance with ASTM E 84.
- D. F - Rating: The time period that a through-penetration firestop limits the spread of flame and hot gases through fire resistive construction, including the penetrating items, when tested in accordance with the time-temperature curve defined in ASTM E 119.
- E. T - Rating: The time period that a through-penetration firestop limits temperature rise through the fire resistive construction, including the penetrating items, as defined in ASTM E 119.

1.4 SUBMITTALS

- A. Submit complete list of all firestopping systems and materials to be utilized, including documentation of UL or FM Classifications or approved third party testing. Include all of the individual materials required for each complete system. Indicate manufacturer's product name and number for each material.
- B. Submit copies of manufacturer's product data, specifications, recommendations, standard details and installations instructions for all firestop assemblies.

1.5 QUALITY ASSURANCE

- A. Installations shall be performed by an experienced firestopping contractor who is certified, licensed or otherwise qualified by the firestopping manufacturer to install the manufacturer's products as per specified requirements.

- B. Single-Source Responsibility: Where possible, obtain through-penetration firestop systems for each kind of penetration and construction condition indicated from a single manufacturer.

#### 1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver firestopping products to Project site in original, unopened containers or packages with intact and legible manufacturer's labels identifying product and manufacture; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to project; curing time and mixing instructions for multi-component materials.
- B. Store and handle firestopping materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants or other causes.
- C. Conspicuously mark "REJECTED" on materials which have been damaged and will be removed from the site. Do not use rejected materials on this project.
- D. Material Safety Data Sheets (MSDS) will be available on the site for all materials. Follow manufacturer's guidelines for use, handling and disposal.

#### 1.7 PROJECT CONDITIONS

- A. Environmental Conditions: Do not install firestopping when ambient or substrate temperatures are outside limits permitted by firestopping manufacturers or when substrates are wet.
- B. Ventilation: Ventilate firestopping per firestopping manufacturer's instructions by natural means or, where this is inadequate, forced air circulation.
- C. Coordinate Work: Coordinate construction of openings and penetrating items with other Divisions to ensure that designated through-penetration firestop systems are installed per specified requirements.

#### 1.8 WARRANTY

- A. All firestop and firesafing materials shall be warranted, in writing, by the manufacturer against any defects in materials and manufacturing.
- B. Completed installation shall be warranted, in writing, by the installer against defects in workmanship.

## 1.9 ENVIRONMENTAL REQUIREMENTS

- A. All materials shall be asbestos free and non-carcinogenic.
- B. Firestop materials shall contain no flammable or toxic solvents and shall not produce toxic or flammable outgassing during the drying or curing process.
- C. Firestop materials used shall not require solvent based chemicals for clean-up purposes.
- D. Water-based, non-toxic firestop materials shall be used.

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with requirements, provide products from one of the following manufacturers as shown below:
  - 1. International Protective Coatings Corporation (design make).
  - 2. 3M Company.
  - 3. Dow Corning.
  - 4. Metacaulk.
  - 5. S T I.
  - 6. Flamesafe.
  - 7. HILTI, Inc.

### 2.2 PHYSICAL REQUIREMENTS

- A. Through-penetration firestop systems and firestop devices shall be tested in accordance with ASTM E 814 using F and T- ratings, shall be classified for use with the particular type of penetrating material used, and shall maintain the same integrity as the fire barrier being sealed.
- B. All products used shall be water-resistant after drying or curing and shall be unaffected by high humidity, condensation or transient water exposure.
- C. Penetrations containing loose electrical, data, or communications cabling shall be protected using firestopping systems that allow unrestricted cable changes without damage to the seal.
- D. Maximum flame spread of 25 and smoke development of 50 when tested in accordance with ASTM E 84 (except intumescent moldable putty).
- E. All materials shall have a minimum one year shelf life.

- F. Materials and system designs shall not require ampacity derating in power cable installations.
- G. Materials supplied under this specification shall be compatible with all materials used in the building construction.

## 2.3 MATERIALS

- A. Water-based thixotropic firestop sealant available in caulkable, trowelable or pourable formulations; IPC Flamesafe FS 900 Series.
- B. Water-based, elastomeric, intumescent firestop sealant; IPC Flamesafe FS 1900.
- C. Intumescent, moldable firestop putty; IPC Flamesafe FS 1000-1077-1100 Series.
- D. Pre-engineered, plant fabricated, self-sealing firestop collar device manufactured from galvanized steel lined with a heat-activated intumescent moldable putty. Device to be installed on the job site with no additional component fabrication required; IPC Flamesafe Firestop Collar Device System.
- E. Reusable heat expanding bags used as a permanent firestop system; IPC Flamesafe or KBS Sealbags.
- F. Cementitious, firestop compound, job site mixed either by hand or using mortar or plastering machine with a worm gear type pump. Designed for large penetrations; IPC Flamesafe Mortar.
- G. Safing sealant in curtain wall joints and other construction joints to stop smoke, gas and fire migration; IPC Flamesafe C700 Sealant.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Examine adjoining construction and the conditions under which the Work is to be completed. Do not proceed with Work until any unsatisfactory conditions detrimental to the proper and timely completion of the Work have been corrected.
- B. Verify that openings and items (penetrations) passing through them are ready to receive the Work of this Section.
- C. Verify that field dimensions are as shown on the Drawings and as recommended by the manufacturer.

### 3.2 PREPARATION

- A. Surface cleaning: Clean out openings and joints immediately prior to installing firestopping to comply with recommendations of firestopping manufacturer and the following requirements:
  - 1. Remove all foreign materials from surfaces of opening and joint substrates and from penetrating items that could interfere with adhesion of firestopping.
  - 2. Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.
  - 3. Remove laitance and form release agents from concrete.
- B. Priming: Prime substrates where recommended by firestopping manufacturer using that manufacturer's recommended products and methods. Confine primers.

### 3.3 INSTALLATION

- A. Comply with the through-penetration firestop manufacturer's installation instructions and Drawings pertaining to products and applications indicated.
- B. Confirm all requirements of the specific through-penetration system used prior to installation of any elements of the Work. Verify material, maximum diameter, minimum weight, installation thickness/density, annular space, etc.
- C. Coordinate with fire protection and other trades to assure that all pipe, conduit, cable and other items which penetrate fire rated construction have been permanently installed prior to installation of firestops and smoke seals. Schedule and sequence Work to assure partitions and other construction that would conceal penetrations are not erected prior to the installations of firestop, firesafing and smoke seals.
- D. Apply firestops and smoke seals in all locations required by national, municipal and local governing laws and codes.
- E. Apply firestopping materials only when the temperature of the surfaces to be filled and surrounding air temperature comply with the manufacturer's printed instructions.
- F. Personal safety gear shall be utilized in accordance with manufacturer's instructions, material and environmental considerations.

### 3.4 FIELD QUALITY CONTROL

- A. Verify that system(s) are installed in all specified and/or indicated locations in rated assemblies.

- B. Verify that proper, specified firestopping materials are used in the firestop system and that system is installed in strict accordance with the latest independent testing agency or manufacturer's latest published requirements.
- C. Install forming/damming materials and other accessories of types required to support fill materials during their application and in the position needed to produce the cross-sectional shapes and depths required to achieve fire ratings of designated through-penetration firestop systems. After installing fill materials, remove forming materials and other accessories not indicated as permanent components of firestop systems.
- D. Install fill materials for through-penetration firestop systems by proven techniques to produce the following results:
  - 1. Completely fill voids and cavities formed by openings, forming materials, accessories and penetrating items.
  - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
  - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes. Install any covering materials or finish as per design requirements and manufacturer's instructions.
- E. The penetration of any walls or partitions by any wiring or cables without conduit is not permitted. No bare wire penetrations are permitted.
- F. After installation, properly identify all firestop systems. Identification shall occur at location where system has been installed and shall include:
  - 1. Identify the firestopping system that has been installed as being a "Rated Through-Penetration Firestop System - Do Not Disturb".
  - 2. Use label, minimum 3" by 5", yellow and black OSHA colors with manufacturers, building owner representative and/or contractor clearly identified.
- G. Do not proceed to enclose firestopping with other construction until an Onondaga County Fire Coordinator's Office representative has inspected the Work and given approval to close the Work.
- H. Where necessary, repairs shall be made and repaired installations shall be reinspected.



### 3.5 CLEANING

- A. Clean off excess fill materials and sealants adjacent to openings and joints as Work progresses by methods and with cleaning materials accepted by manufacturers of firestopping products and of products in which opening and joints occur.
- B. Protect firestopping during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to produce firestopping complying with specified requirements.

END OF SECTION 260510

## SECTION 260519 – WIRES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes building wires and cables, and wiring connectors and connections for power, lighting, signal, control and related systems rated 600 volts and less.
- B. Provide all labor and materials necessary to perform the Work required for the complete installation and operation of related Work on all Contract Documents.
- C. Type AC Armored Cable and Type MC Metal-Clad Cable is not permitted for use on this project.

#### 1.2 REFERENCES

- A. National Fire Protection Association (NFPA):  
No. 70              National Electrical Code; Article 310.
- B. Underwriters Laboratories, Inc. (UL):  
UL 83              Thermoplastic-Insulated Wires.  
UL 486A           Wire Connectors and Soldering Lugs for use with Copper Conductors.
- C. American Society for Testing and Materials:  
Std B3              Standard Specification for Soft or Annealed Copper Wire  
Std B8              Standard Specification for Concentric-Lay-Stranded Copper Conductors,  
Hard,              Medium-Hard or Soft  
Std B496           Standard Specification for Compact Round Concentric-Lay-Stranded  
Copper              Conductors
- D. Institute of Electrical and Electronic Engineers (IEEE):  
Std 82              Test Procedure for Impulse Voltage Tests on Insulated Conductors.

#### 1.3 SUBMITTALS

- A. Provide product data for electrical wires and connectors.

#### 1.4 QUALITY ASSURANCE

- A. Conform to applicable codes and regulations regarding toxicity of combustion products of insulating materials.
- B. Provide components that are listed and labeled by UL.

#### 1.5 DELIVERY

- A. Mark and tag insulated conductors for delivery to the Site.

#### 1.6 COOPERATION

- A. Determine required separation between wiring and other Work.
- B. Determine wire routing to avoid interference with other Work.

#### 1.7 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on Drawings.
- B. Wire routing shown on Drawings is approximate unless dimensioned. Route wire and cable as required to meet Project Conditions.
- C. Where wire routing is not shown, and destination only is indicated, determine exact routing and lengths required.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

- 1. Wire:

- Cerro Wire LLC.
  - Colonial Wire & Cable Co.
  - Encore Wire Corporation.
  - General Cable Technologies Corporation.
  - OMNI Cable.
  - Republic Wire, Inc.
  - Southwire Company.
  - United Copper Industries.

2. Connectors for Wires and Conductors:

AMP Special Industries  
3M Company  
Burdny Corp.  
Cooper Crouse Hinds.  
Dossert Mfg. Corp.  
Hubbell Killark.  
Ideal Industries Inc.  
O-Z/Gedney Co.  
Thomas & Betts Corp.

2.2 WIRES

- A. Provide wire suitable for the temperature, conditions and location where installed.
- B. Use single conductor insulated wire, installed in raceway. The use of MC, flexible metal clad cable is prohibited on this project.
- C. Insulation Voltage Rating: 600 volts.
- D. Conductors: Provide solid conductors for power and lighting circuits No. 10 AWG and smaller. Provide stranded conductors for all sizes No. 8 AWG and larger and for control circuits.
- E. Conductors for Fire Alarm Systems: Provide solid only copper conductors.
- F. Conductor Material: Annealed copper, 98 percent conductivity, for all wires and cables. Aluminum conductors prohibited.
- G. Insulation: Provide THHN/THWN-2 insulation for all conductors sizes.
- H. Insulation for all Isolated Power Systems: Provide low dielectric constant XHHW-2 insulated conductors designated as XHHW-2 CT with FR-XLPE insulation, General Cable Spec 5175 or accepted equal.
- I. Minimum size shall be No. 12 AWG for branch and other circuits.

- J. Color coding for phase identification in accordance with the following table:

Three Phase

Phase	120/208 Volt
Ground	Green
Neutral	White
A or L1	Black
B or L2	Red
C or L3	Blue

Where neutral conductors of different systems are installed in the same raceway or enclosure, each multiple conductor shall have an outer covering of white with a readily distinguishable different colored stripe (not green) running along the insulation, or other and different means of identification as allowed by Section 200-6(a) or (b) of the National Electrical Code.

- K. Isolated circuit conductors shall be identified as follows:

Isolated Conductor No. 1	Orange*
Isolated Conductor No. 2	Brown*
Isolated Conductor No. 3 (3 phase)	Yellow*

\*Provide with at least one distinctive colored stripe other than white, green or gray along the entire length of the conductor. Where isolated circuit conductors supply 125-volt, single-phase, 15- and 20-ampere receptacles, the striped orange conductor(s) shall be connected to the terminal(s) on the receptacles that are identified in accordance with 200.10(B) for connection to the grounded circuit conductor.

- L. Temperature Limitations: The temperature rating associated with the ampacity of a conductor shall be selected and coordinated so as not to exceed the lowest temperature rating of any connected termination, conductor, or device, per NEC 110.14.

## 2.3 CONNECTORS FOR CONDUCTORS

- A. Provide UL-listed factory-fabricated, solderless metal connectors of sizes, ampacity ratings, materials, types and classes for applications and for services indicated. Use connectors with temperature ratings equal to or greater than those of the wires upon which used.
- B. Connectors specified are part of a system. Furnish connectors and components, and use specific tools and methods as recommended by connector manufacturer to form complete connector system.

C. Splices:

1. Spring Type: Amerace Corp. Elastimold Div.'s Buchanan B-Cap, Electrical Products Div./3M's Scotchlok Type Y, R, G, or B, Ideal Industries Inc.'s Wing Nuts or Wire Nuts, or Thomas & Betts Corp.'s Piggies.
2. Indent Type with Insulating Jacket: Amerace Corp. Elastimold Div.'s Buchanan Pressure Connectors, Ideal Industries Inc.'s Crimp Connectors, or Thomas & Betts Corp.'s STA-KON.
3. Indent Type (Uninsulated): Burndy Corp.'s Hydent, or Thomas & Betts Corp.'s Compression Connectors.

D. Terminals: Nylon insulated pressure terminal connectors as manufactured by Amp Special Industries, Burndy Corp., Ideal Industries Inc., Panduit Corp., Thomas & Betts Corp., or Wiremold Co.

E. Lugs:

1. Single Cable (Compression Type Lugs): Copper, one-or 2-hole style (to suit conditions), long barrel; Burndy Corp.'s Hylug YA, Ideal Industries Inc.'s CCB or CCBL, or Thomas & Betts Corp.'s 54930BE or 54850BE Series.
2. Single Cable (Mechanical Type Lugs): Copper, one-or 2-hole style (to suit conditions); Burndy Corp.'s Quicklug Series, or Thomas & Betts Corp.'s Locktite Series.
3. Multiple Cable (Mechanical Type Lugs): Copper, configuration to suit conditions; Burndy Corp.'s Quicklug Series, or Thomas & Betts Corp.'s Locktite Series.

2.4 TAPES

A. Insulation Tapes:

1. Plastic Tape: Bishop Electric Corp.'s No. 85, Electrical Products Div./3M's Scotch 88, Plymouth Rubber Co.'s Premium CW.
2. Rubber Tape: Bishop Electric Corp.'s No. W-963, Electrical Products Div./3M's Scotch 33, or Plymouth Rubber Co.'s Splicing Compound ASTM.
3. Moisture Sealing Tape: Bishop Electric Corp.'s No. 4000T, Electrical Products Div./3M's Scotch 2200 or 2210, or Plymouth Rubber Co.'s Plyseal.
4. Electrical Filler Tape: Bishop Electric Corp.'s No. 125T, Electrical Products Div./3M's Scotchfil, or Plymouth Rubber Co.'s Slipknot Filler Tape.
5. Color Coding Tape: Bishop Electric Corp.'s No. 112T, Electrical Products Div./3M's Scotch 35, or Plymouth Rubber Co.'s Slipknot 37.

## 2.5 WIRE-PULLING COMPOUNDS

- A. To suit type of insulation; American Polywater Corp.'s Polywater, Electro Compound Co.'s Y-Er-Ease, Greenlee Tool Div.'s Green 80, Gould Inc.'s Electrical Component Div.'s WGY, Hillcrest Laboratories Inc.'s Polylube 7, or Ideal Industries Inc.'s Aqua-Gel, Yellow 77 or Wire-Lube.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Install conductors in interior raceways after the raceway system is completed and plastering in specific Work areas of the building are finished.
- B. Install conductors in outside and underground raceways after raceway system is completed.
- C. No grease, oil, or lubricant other than wire-pulling compounds specified may be used to facilitate the installation of conductors.
- D. Use nylon line, polyethylene line, or manila rope as pullrope when installing conductors in conduits.

### 3.2 EXAMINATION

- A. Verify that Work likely to damage wire has been completed.
- B. Verify that interior of building has been protected from weather.

### 3.3 WIRING METHODS

- A. Except as noted above, use building wire, Type THHN/THWN-2 insulation, in raceway:
  - 1. For concealed dry interior locations.
  - 2. For exposed dry interior locations.
  - 3. Above accessible ceilings.
- B. Use building wire, Type THHN/THWN-2 insulation, in raceway:
  - 1. For wet or damp interior locations.
  - 2. For exterior locations.
  - 3. For underground installations.
- C. Use wiring methods indicated on Drawings.

### 3.4 INSTALLATION OF WIRES

- A. Install electrical wires and connectors in compliance with NEC and the manufacturers' instructions.
- B. Cooperate with other Divisions for the exact installation of all wires.
- C. Completely and thoroughly swab raceway before installing wire.
- D. Pull conductors simultaneously where more than one is being installed in same raceway. Use UL listed pulling compound or lubricant for building wire No. 4 AWG and larger, and for smaller conductors where approved.
- E. Use pulling means including fish tape, cable, rope, and basket weave wire/cable grips which will not damage cables or raceways. Do not use rope hitches for pulling attachment to wire.
- F. Keep conductor splices to minimum.
- G. Install splice and tap connectors that possess equivalent or better mechanical strength and insulation rating than conductors being spliced.
- H. Use splice and tap connectors that are compatible with conductor material.
- I. Provide adequate length of conductors within electrical enclosures and train the conductors to terminal points with no excess. Bundle multiple conductors, with conductors larger than No. 10 AWG cabled in individual circuits. Make terminations so there is no bare conductor at the terminal.
- J. Neatly train and lace wiring inside boxes, equipment, and panelboards.

### 3.5 CIRCUITING

- A. Install a maximum of three (3) single phase circuits in a single raceway (six current carrying conductors' maximum plus three ground), unless otherwise specifically called for on the Drawings; no exceptions.
- B. Install a maximum of one (1) three phase circuit in a single raceway, unless otherwise specifically called for on the Drawings.
- C. Provide separate neutral and ground for every circuit; shared neutrals and grounds may not be used.
- D. Install conductors of size shown on Drawings. Where size is not indicated for branch circuit wiring, the minimum size allowed is No. 12 AWG.
- E. Use No. 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet.



- F. Maximum voltage drop permissible for any branch circuits or feeder circuits shall be limited to 3%.
- G. Install green copper grounding wire for every circuit.

### 3.6 INSTALLATION OF CONNECTORS

- A. Clean conductor surfaces before installing lugs and connectors.
- B. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- C. Splices:
  - 1. Dry Locations:
    - a. For Conductors No. 8 AWG or Smaller: Use spring type pressure connectors or indent type pressure connectors with insulating jackets (except where special type splices are required).
    - b. For Conductors No. 6 AWG or Larger: Use uninsulated indent type pressure connectors. Fill indentations with electrical filler tape and apply insulation tape to insulation equivalent of the conductor, or insulate with heat shrinkable splices.
  - 2. Damp Locations: As specified for dry locations, except apply moisture sealing tape over the entire insulated connection (moisture sealing tape not required if heat shrinkable splices are used).
  - 3. Wet Locations: Use uninsulated indent type pressure connectors and insulate with resin splice kits or heat shrinkable splices.
- D. Terminations:
  - 1. For Conductors No. 10 AWG or Smaller: Use terminals for:
    - a. Connecting control and signal wiring to terminal strips.
    - b. Connecting wiring to equipment designed for use with terminals.
  - 2. For Conductors No. 8 AWG or Larger: Use compression or mechanical type lugs for:
    - a. Connecting wire to flat bus bars.
    - b. Connecting wire to equipment designed for use with lugs.
  - 3. For Conductor Sizes Larger Than Terminal Capacity On Equipment: Reduce the larger conductor to the maximum conductor size that terminal can accommodate (reduced section not longer than one foot). Use compression or mechanical type connectors suitable for reducing connection.

### 3.7 CONTROL AND SIGNAL WIRING INSTALLATION

- A. Except where otherwise required, install a separate power supply circuit for each system so that malfunctions in any system will not affect other systems.
- B. Where separate power supply circuits are not shown, connect the systems to the nearest panelboards of suitable voltages, which are intended to supply such systems and have suitable spare circuit breakers or space for installation.

### 3.8 FIELD QUALITY CONTROL

- A. Inspect wire for physical damage and proper connection.
- B. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.
- C. Prior to energizing, check installed wires with megohm meter to determine insulation resistance levels to assure requirements are fulfilled.
- D. Prior to energizing, test wires for electrical continuity and for short-circuits.
- E. Subsequent to wire hook-ups, energize circuits and demonstrate proper functioning. Correct malfunctioning units, and retest to demonstrate compliance.

END OF SECTION 260519

## SECTION 260526 – GROUNDING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes general criteria required for grounding and bonding. Locations, details and extent of electrical grounding and bonding are as indicated on the Drawings and schedules and as specified herein.
- B. Provide all labor, materials and equipment necessary to perform the Work required for the complete installation and operation of Work.

#### 1.2 REFERENCES

- A. Electrical Code Compliance: Comply with applicable local code requirements of the authority having jurisdiction and the applicable articles of NEC.
- B. UL Compliance: Comply with applicable requirements of UL Standards No.'s 467, "Electrical Grounding and Bonding Equipment", and 869, "Electrical Service Equipment", pertaining to grounding and bonding of systems, circuits and equipment.
- C. Federal Specifications: Comply with all applicable federal specifications.
- D. IEEE Compliance: Comply with applicable requirements and recommended installation practices of IEEE Stds 80, 81, 141 and 142 pertaining to grounding and bonding of systems, circuits and equipment.
- E. National Electrical Safety Code (NESC): Comply with all applicable section of the code.
- F. ANSI J-STD 607A: Commercial Building Grounding and Bonding Requirements for Telecommunications.

#### 1.3 SYSTEM DESCRIPTION

- A. Provide all service grounding and bonding. Cooperate with the other Divisions of Work such as HVAC, Fire Protection, Plumbing and General Construction.

#### 1.4 DEFINITIONS

- A. Ground: A conducting connection, whether intentional or accidental, between an electrical circuit or equipment and the earth, or to some conducting body that serves in place of the earth.

- B. Grounded: Connected to earth or to some conducting body that serves in place of the earth.
- C. Grounded Conductor: A system or circuit conductor that is intentionally grounded.
- D. Grounding Conductor: A conductor used to connect equipment or the grounded circuit of a wiring system to a grounding electrode or electrodes.
- E. Grounding Conductor, Equipment: The conductor used to connect the noncurrent-carrying metal parts of equipment, raceways, and other enclosures to the system grounded conductor and/or the grounding electrode conductor at the service equipment or at the source of a separately derived system.
- F. Grounding Electrode Conductor: The conductor used to connect the grounding electrode to the equipment grounding conductor and/or to the grounded conductor of the circuit at the service equipment or at the source of a separately derived system.

## 1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, specifications and installation instructions.

## 1.6 QUALITY ASSURANCE

- A. Codes and Standards: As indicated in Article 1.2.
- B. Test the grounding resistance using an "Earth Megger", or accepted equal, per test equipment manufacturer's recommendations and submit test results for review. Submit equipment make and model with results.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver equipment in factory-fabricated containers or wrappings, which properly protect equipment from damage.
- B. Store equipment in original packaging. Store inside well ventilated area protected from weather, moisture, soiling, extreme temperatures, humidity; laid flat and blocked off ground.
- C. Handle equipment carefully to prevent damage, breaking, and scoring of finishes. Do not install damaged units or components; replace with new.

## PART 2 - PRODUCTS

### 2.1 MATERIAL

- A. Ground Clamps (Cable to Pipe): Mechanical type of silicon bronze; Burndy GAR, GD, GP, GK; O-Z/Gedney ABG, CG, DG, EG, FG, HG; Thomas & Betts 3902, BU series, or accepted equal.
- B. Ground Clamp (Cable to Rod): Mechanical type of silicon bronze; Joslyn J8A92AB, McGraw Edison DN13G5, or accepted equal.
- C. Ground Lugs: Burndy Hylug YA-2L, YA-2LN, YA-2, YA-2N; Thomas & Betts 54204 series, 54850 series, or accepted equal.
- D. Exothermic Weld: Provide fusion welds specifically designed for type and size of cable, rods, etc.; Erico Products Inc. Cadweld Process, or accepted equal.
- E. Ground Rods: Copper-clad (minimum 0.10 jacket) steel ground rods, minimum 5/8" diameter by 8'- 0" long , unless otherwise indicated on the Drawings.
- F. Plate Electrodes: Copper plates minimum 0.06 inches thick by 2'- 0" square feet surface area.
- G. Grounding Electrode Conduit and Bonding Conductor: Bare stranded copper, minimum #4/0. Size shall meet NFPA 70 requirements.
- H. Equipment Grounding Conductor: THWN insulated, stranded copper, size as indicated on the Drawings.
- I. Hardware: Silicon bronze bolts, nuts, flat & lock washers, etc. as manufactured by Burndy, Dossert Corp., Everdur, O-Z/Gedney, or accepted equal.

### 2.2 TELECOMMUNICATIONS GROUNDING BUSBAR

- A. Telecommunications Grounding Busbar (TGB Pattern): Solid copper grounding busbar assembly, nominally 1/4" thick x 2" wide x 12" long with hole patterns as recommended by BICSI and ANSI/EIA/TIA-607 standards, U.L. Listed. Suitable for wall mounting completely preassembled with solid copper busbar, insulators, stand-off brackets, stainless steel bolts and complete hardware kit, as manufactured by Chatsworth Products Inc. 13622-012 series, Cooper B-Line SBTGBK series, or Newton Instrument Company 2213090010 series.

- B. Telecommunications Main Grounding Busbar (TMGB Pattern): Solid copper grounding busbar assembly, nominally ¼" thick x 4" wide x 20" long with hole patterns as recommended by BICSI and ANSI/EIA/TIA-607 standards, U.L. Listed. Suitable for wall mounting completely preassembled with solid copper busbar, insulators, stand-off brackets, stainless steel bolts and complete hardware kit, as manufactured by Chatsworth Products Inc. 40153-020 series, Cooper B-Line SBTMGB20K series, or Newton Instrument Company 2213110010 series.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that final backfill and compaction have been completed before driving rod electrodes.

### 3.2 INSTALLATION

- A. Install products in accordance with the manufacturer's instructions.
- B. Provide connections using silicon bronze hardware and ground clamps, ground lugs or compression connectors to suit the job conditions.
- C. Solder is prohibited from connections.
- D. Provide separate insulated equipment grounding conductor within each feeder and branch circuit raceway per NEC Table 250-122 or as indicated, whichever is larger. Terminate each end on suitable lug, bus or bushing.
- E. Bond all equipment and metallic boxes per NEC. Provide bonding connection to all water pumps, including domestic water. Surface of pipe shall be thoroughly cleaned immediately prior to making connection.
- F. Bond the incoming fire water main, as is applicable.
- G. Bond all metallic shields and metallic supporting structures, metallic conduits, wireways, metal enclosures or busways, cable boxes, equipment housings, cable trays, ladder racks, equipment racks, frames, protectors, cabinets and all non-current carrying metallic parts of the installed telecommunications services with minimum #6 AWG green insulated copper conductor to the telecommunications grounding busbar (TGB). The metallic conduit system shall be used for equipment and enclosure grounding, but not as a system ground conductor.
- H. Bond all telecommunications grounding busbars (TMGB's and/or TGB's) with minimum #4/0 AWG bare copper ground conductor to main electrical service grounding system.

- I. Conduit that only contains a grounding conductor, and is provided for its mechanical protection, shall be bonded to that conductor at the entrance and exit from the conduit.
- J. Bond all metallic piping (air, water, gas, oxygen and vacuum, etc.) to ground in accordance with National Electrical Code (NEC) Article 250.104(B).

### 3.3 FIELD QUALITY CONTROL

- A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.
- B. Use suitable test instrument to measure resistance to ground of system. Perform testing in accordance with test instrument manufacturer's recommendations using the fall-of-potential method.

END OF SECTION 260526

## SECTION 260529 – SUPPORTING DEVICES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes secure support from the building structure for electrical items by means of hangers, supports, anchors, sleeves, inserts, seals, and associated fastenings.

#### 1.2 REFERENCES

- A. National Fire Protection Association (NFPA):  
No 70                      National Electrical Code
- B. National Electrical Manufacturers Association (NEMA):  
FB 1                      Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies

#### 1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for each type of product specified.
- C. Shop Drawings indicating details of fabricated products and materials.
- D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

#### 1.4 QUALITY ASSURANCE

- A. Electrical Component Standard: Components and installation shall comply with NFPA 70, "National Electrical Code."
- B. Electrical components shall be listed and labeled by UL, ETL, CSA, or other approved, nationally recognized testing and listing agency that provides third-party certification follow-up services.



## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
1. Slotted Metal Angle and U-Channel Systems:  
Allied Tube & Conduit  
American Electric  
B-Line Systems, Inc.  
Cinch Clamp Co., Inc.  
GS Metals Corp.  
Haydon Corp.  
Kin-Line, Inc.  
Unistrut Diversified Products
  2. Conduit Sealing Bushings:  
Bridgeport Fittings, Inc.  
Cooper Industries, Inc.  
Elliott Electric Mfg. Corp.  
GS Metals Corp.  
Killark Electric Mfg. Co.  
Madison Equipment Co.  
L.E. Mason Co.  
O-Z/Gedney  
Producto Electric Corp.  
Raco, Inc.  
Red Seal Electric Corp.  
Spring City Electrical Mfg. Co.  
Thomas & Betts Corp.

### 2.2 COATINGS

- A. Coating: Supports, support hardware, and fasteners shall be protected with zinc coating or with treatment of equivalent corrosion resistance using approved alternative treatment, finish, or inherent material characteristic. Products for use outdoors shall be hot dipped galvanized.

## 2.3 MATERIALS

- A. Fasteners: Furnish all fasteners and hardware compatible with the materials and methods required for attachment of supporting devices.
1. Slotted - Type Concrete Inserts: Galvanized pressed steel plate complying with ASTM A283; box-type welded construction with slot designed to receive steel nut and with knockout cover; hot dipped galvanized in compliance with ASTM A 386.
  2. Masonry Anchorage Devices: Expansion shields complying with Federal Specification FF-S-325, as follows:
    - a. Furnish lead expansion shields for machine screws and bolts  $\frac{1}{2}$ " and smaller; head-out embedded nut type, single unit class, Group I, Type 1, Class 1.
    - b. Furnish lead expansion shields for machine screws and bolts larger than  $\frac{1}{2}$ " in size; head-out embedded nut type, multiple unit class, Group I, Type 1, Class 2.
    - c. Furnish bolt anchor expansion shields for lag bolts, zinc alloy, long-shield anchors class, Group II, Type 1, Class 1.
    - d. Furnish bolt anchor expansion shields for bolts, closed-end bottom bearing class, Group II, Type 2, Class 1.
  3. Toggle Bolts: Tumble-wing type, complying with Federal Specification FF-B-588, class and style as required.
  4. Nuts, Bolts, Screws, Washers:
    - a. General: Furnish zinc-coated fasteners, with galvanizing complying with ASTM A 153 for exterior use or where built into exterior walls. Furnish fasteners for the type, grade and class required for the particular installation.
    - b. Standard Nuts and Bolts: Regular hexagon head type, complying with ASTM A307, Grade A.
    - c. Lag Bolts: Square head type, complying with Federal Specification FF-B-561.
    - d. Machine Screws: Cadmium plated steel, complying with Federal Specification FF-S-92.
    - e. Wood Screws: Flat head carbon steel, complying with Federal Specification FF-S-111.
    - f. Plain Washers: Round, general assembly grade carbon steel, complying with Federal Specification FF-W-92.
    - g. Lock Washers: Helical Spring type carbon steel, complying with Federal Specification FF-W-84.
- B. "C" Beam Clamps:
1. For  $\frac{1}{2}$ " to 2" Conduit Maximum: Caddy Fastener Div./Erico Products Inc. BC Series; HIT Spring Steel Fasteners, Inc. CH Series.
  2. For 3" Conduit Maximum: Kindorf Elec. Prod. Div/Midland Ross Corp. 500 Series beam clamp with 6HO-B Series hanger; Gedney Electric Co. IS-500 Series beam clamp with H-OWB Series hanger; Appleton Electric Co. BH-500 Series beam clamp with H50W/B Series hangers.

3. For 4" Conduit Maximum: Kindorf Elec. Prod. Div./Midland Ross Corp. E-231 beam clamp and E-234 anchor clip and C-149 series lay-in hanger; Unistrut Corp. P2676 beam clamp and P-1659A Series anchor clip with J1205 Series lay-in hanger.
  4. For Threaded Rods (100 lbs. load max.): Caddy Fastener Div./Erico Products Inc. Cat. No. BC-4A; HIT Spring Steel Fastener Inc. master clamp MC.
  5. For Threaded Rods (200 lbs. load max.): Kindorf Elec. Prod. Div./Midland Ross Corp. 500 Series; Gedney Electric Co. IS-500 Series; Appleton Electric Co. BH-500 Series.
  6. For Threaded Rods (300 lbs. load max.): Kindorf Elec. Prod. Div./Midland Ross Corp. E-231 beam clamp and E-234 anchor clip; Unistrut Corp. P2676 beam clamp and F-1659A Series anchor clips.
- C. Fastening Fittings for Wood and Existing Masonry: Versabar Corp. VX-4310, VX-2308, VX-4308, VX-4309; Kindorf Elec. Prod. Div./Midland Ross Corp. E-243, E-244, E-245, E-170; Unistrut Corp. P2682.
- D. Pipe Straps: Two-hole steel conduit straps with Galv-Krom finish, Kindorf Elec. Prod. Div./Midland Ross Corp. C-144 or C-280 Series.
- E. Pipe Clamps: One-hole malleable iron type clamps, Kindorf Elec. Prod. Div./Midland Ross Corp. HS-400 Series; Gedney Electric Co. 14-50 Series.
- F. Deck Clamps: Caddy Fastener Div./Erico Products Inc. DH-4-T1 Series; HIT Spring Steel Fasteners, Inc. RD Series.
- G. Fixture Stud and Strap: Steel Electrical Products Div. FE-431; Gedney Electric Co. SL-134.
- H. Channel Support System and Accessories: Furnish 12 gage galvanized steel channel and accessories as manufactured by:
1. Kindorf Elec. Prod. Div./Midland Ross Corp., B-905 (1½" x 1½"), B-909 (1½" x 17/8"), B-903 (1½" x 3").
  2. Unistrut Corp.; P-3000 (1-3/8" X 1-5/8"), P-5500 (1-5/8" X 2-7/16"), P-5500 (1-5/8" X 3 ¼").
  3. B-Line Division, The Binkley Co.; B-22 (1-5/8" X 1-5/8"), B-12 (1-5/8" X 2-7/16"), B-11 (1-5/8" X 3 ¼").
  4. Versabar Corp.; VA-1 (1-5/8" X 1-5/8" ), VA-3 (1-5/8" X 2 ½").
- I. Channel Support Pipe Straps: Kindorf C105, C106.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Provide anchors, fasteners and supports in accordance with NECA "Standard of Installation".
- C. Fasten supports to building structure.
- D. Attachment of Conduit System:
  - 1. Wood Construction: Attach conduit to wood construction by means of pipe straps or pipe clamps and wood screws or lag bolts.
  - 2. Masonry Construction: Attach conduit to masonry construction by means of pipe straps or pipe clamps and masonry anchorage devices.
  - 3. Steel Beams: Attach conduit to steel beams by means of "C" beam clamps and hangers.
  - 4. Steel Decking:
    - a. For Steel Decking With Hanger Tabs: Use deck clamps and hangers.
    - b. For Steel Decking Without Hanger Tabs: Attach conduit to steel decking by means of pipe straps, pipe clamps or hangers. Fasten straps, clamps or hangers to steel decking with welded threaded studs, machine screws, self-drilling, self-tapping fasteners, or with 3/8" threaded steel rod, welded to a 4" X 4" X 1/4" steel plate and installed through 1/2" hole in roof deck.
  - 5. Multiple Parallel Conduit Runs: Use channel support system.
  - 6. Conduit Above Suspended Ceiling: Do not rest conduit directly on runner bars, T-bars, etc. Support conduit from permanent structure or construction above suspended ceiling.
- E. Channel Support System: Install channel support system as high as possible; coordinate with other trades' work.
- F. Combination Channel Support Raceway System: Install system as high as possible; coordinate with other trades' work. Install accessories as required to use channel support as a combination channel support raceway system.
- G. Support of Luminaires: Refer to Specification Section 26 51 13 for support of all luminaires shown on the Drawings.
- H. Do not drill or cut structural members, unless specifically permitted by Architect in writing.
- I. Install surface mounted cabinets and panelboards with minimum of four anchors.

- J. In wet or damp locations, use steel channel supports to stand cabinets and panelboards one (1) inch off wall.
- K. Use sheet metal channel to bridge studs above and below cabinets and panelboard recessed in hollow partitions.

END OF SECTION 260529

## SECTION 260533 – RACEWAYS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. The following Division 26 Sections must be coordinated and included in the project.
  - 1. Section 260534, SURFACE RACEWAYS

#### 1.2 SUMMARY

- A. This Section includes raceways for electrical wiring. Types of raceways in this section include the following:
  - 1. Rigid Steel Conduit.
  - 2. Intermediate Metal Conduit.
  - 3. Steel Electrical Metallic Tubing.
  - 4. Flexible Metal Conduit.
  - 5. Liquidtight Flexible Metal Conduit
  - 6. Rigid Nonmetallic Conduit
  - 7. Wireways, Fittings, and Accessories.

#### 1.3 REFERENCES

- A. National Fire Protection Association (NFPA):  
No. 70 National Electrical Code, the following Articles:
  - 342, Intermediate Metal Conduit.
  - 344, Rigid Metal Conduit.
  - 348, Flexible Metal Conduit.
  - 350, Liquidtight Flexible Metal Conduit.
  - 352, Rigid Nonmetallic Conduit.
  - 358, Electrical Metallic Tubing.
  - 360, Flexible Metallic Tubing.
  - 362, Electrical Nonmetallic Tubing.
  - 376, Metal Wireways.
  - 378, Nonmetallic Wireways.

B. Underwriters Laboratories, Inc. (UL):

UL 1	Flexible Metal Electrical Conduit.
UL 6	Rigid Metal Electrical Conduit.
UL 360	Liquidtight Flexible Steel Conduit, Electrical.
UL 514B	Fittings for Conduit and Outlet Boxes.
UL 651	Schedule 40 and 80 PVC Conduit.
UL 797	Electrical Metallic Tubing.
UL 870	Electrical Wireways, Auxiliary Gutters, and Associated Fittings.
UL 1242	Intermediate Metal Conduit.

C. National Electrical Manufacturers Association (NEMA)

NEMA, TC 6	PVC and ABS Plastic Utilities Duct for Underground Installation.
NEMA, TC 8	Extra-Strength PVC Plastic Utilities Duct for Underground Installation.
NEMA, TC 9	Fittings for ABS and PVC Plastic Utilities Duct for Underground Installation.
NEMA, TC 10	PVC and ABS Plastic Communications Duct and Fittings for Underground Installation.
NEMA, RN1	PVC Coated Galvanized Rigid Steel conduit.

D. American National Standards Institute (ANSI):

ANSI-C80.1	Specification for Rigid Steel Conduit, Zinc-Coated.
ANSI-C80.2	Specification for Rigid Steel Conduit, Enameled.
ANSI-C80.3	Specification for Electrical Metallic Tubing, Zinc-Coated.
ANSI/NEMA FB 1	Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.

E. American Society for Testing and Materials (ASTM):

ASTM F 512	Standard Specification for Smooth Wall Polyvinylchloride (PVC) Conduit and Fittings for Underground Installation.
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1.4 SUBMITTALS

- A. General: Submit the following products in accordance with Conditions of Contract and Division 1 Specification Sections.

1.5 QUALITY ASSURANCE

- A. Electrical Component Standard: Components and installation shall comply with NFPA 70 "National Electrical Code."

- B. NEMA Compliance: Comply with applicable requirements of NEMA standards pertaining to raceways.
- C. UL Compliance and Labeling: Comply with applicable requirements of UL standards pertaining to electrical raceway systems. Provide raceway products and components listed and labeled by UL, ETL, or CSA.

#### 1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect, and handle products to site in accordance with the specifications.
- B. Accept conduit on site. Inspect for damage.
- C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- D. Protect PVC conduit from sunlight.

#### 1.7 COOPERATION

- A. Cooperate with other Work, including metal and concrete deck installation, as necessary to interface installation of electrical raceways and components.

#### 1.8 PROJECT CONDITIONS

- A. Verify actual field measurements with Drawings.
- B. Verify routing and termination locations of conduit prior to rough-in.
- C. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.



## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
1. Metal Conduit and Tubing:  
AFC, Division of Nortek, Inc.  
Allied Tube and Conduit  
Carol Cable Co., Inc.  
Cerro Wire & Cable Corp.  
LTV Steel Company  
Raco, Inc.  
Robroy Industries, Inc.  
Southwire  
Thomas & Betts Corp.  
Triangle PWC Inc.  
Wheatland Tube Company.
  2. Nonmetallic Conduit and Tubing:  
Allied Tube & Conduit; Division of Tyco  
Canflex PVC Products  
Carlon  
Ipex  
Kraloy
  3. Conduit Bodies:  
American Electric  
Appleton Electric Co.  
Carlon  
Crouse-Hinds  
O-Z/Gedney  
Spring City Electrical Mfg. Co.
  4. Wireway:  
Hoffman Engineering Co.  
Pentair  
Robroy Industries, Inc.  
Keystone Columbia Inc.  
Square D Schneider Electric

### 2.2 RACEWAYS

- A. Rigid Steel Conduit: Galvanized on the outside and enameled on the inside or hot dipped galvanized on the outside and inside.
- B. Intermediate Metal Conduit (IMC): Galvanized on the outside and enameled on the inside or hot dipped galvanized on the outside and inside.

- C. Steel Electrical Metallic Tubing (EMT): Electro- galvanized with zinc chromate coating on the outside and enameled on the inside.
- D. Conduit for Fire Alarm Circuits: All new conduit in unfinished areas, whether exposed or concealed, shall be painted red or be pre-manufactured safety red.
- E. Flexible Metal Conduit: Hot dipped galvanized steel strip shaped into interlocking convolutions.
- F. Liquidtight Flexible Metal Conduit: Heavy galvanized steel core, of interlocked construction with oil resistant thermoplastic cover.
- G. Rigid Nonmetallic Conduit: Schedule 40 Polyvinylchloride (PVC), unless otherwise noted.
- H. Wireways, Fittings and Accessories: General purpose NEMA 1 ANSI 49 gray polyester powder painted finish inside and outside, 16 gauge for sizes 2.5" x 2.5" up to 6" x 6" and 14 gauge for sizes 8" x 8" and larger, with or without knockouts. Keystone Columbia Inc.'s KFW or KFWH Lay-In Wireway System, or Square D Co.'s Square-Duct Combination Lay-In Wireway System LD Series.

## 2.3 FITTINGS AND ACCESSORIES

- A. Insulated Bushings: Appleton Electric Co.'s BU50I Series, Gould Inc.'s Efcor 55-50 Series, Midwest Electric Mfg. Corp.'s 1031 Series, O-Z/Gedney Co.'s IBC- 50 Series, Raco Inc.'s 1132 Series, or Thomas & Betts Corp.'s 1222 Series.
- B. Plastic Bushings for 1/2" and 3/4" Conduit: Appleton Electric Co.'s BBU50, BBU75, Gould Inc.'s Efcor PB1, PB2, Midwest Electric Mfg. Corp.'s 931, 932, O-Z/Gedney Co.'s IB-50, IB-75, Raco Inc.'s 1402, 1403, or Thomas & Betts Corp.'s 222, 223.
- C. Insulated Grounding Bushings: Appleton Electric Co.'s GIB-50 Series, Gould Inc.'s Efcor 56-50-8 Series, Midwest Electric Mfg. Corp.'s GLL Series, O-Z/Gedney Co.'s IBC-50L Series, Raco Inc.'s 1212 Series, or Thomas & Betts Corp.'s 3870 Series.
- D. Connectors and Couplings:
  - 1. Locknuts: Appleton Electric Co.'s BL-50 Series Gould Inc.'s Efcor 151 Series, Midwest Electric Mfg. Corp.'s 10 Series, O-Z/Gedney Co.'s 1-50S Series, Raco Inc.'s 1002 Series, or Thomas & Betts Corp.'s 141 Series.
  - 2. Grounding Wedge: Thomas & Betts Corp.'s 3650 Series, or accepted equal.
  - 3. Couplings (For Rigid and IMC Conduit): Standard threaded couplings as furnished by conduit manufacturer.
  - 4. Three Piece Conduit Coupling (For Rigid and IMC Conduit): Gould Inc.'s Efcor 165 Series, Midwest Electric Mfg. Corp.'s 190 Series, O-Z/Gedney Co.'s 4-50 Series, Raco Inc.'s 1502 Series, or Thomas & Betts Corp.'s 675 Series.
  - 5. EMT set-screw connectors and couplings shall not be permissible.

6. Compression Type (For EMT 1/2" and larger): Appleton Electric Co.'s TW-50CS1, TWC-50CS Series, EMT 2241, 2231 Series, Gould Inc.'s Efcor 760, 750 B Series, Midwest Electric Mfg. Corp.'s 660S, 1650 Series, Raco Inc.'s 2912, 2922 Series, Tomic Electric's TW120, TW140 Series, or Thomas & Betts Corp.'s 5120, 5123 Series.
  7. Flexible Metal Conduit Connectors: Midwest Electric Mfg. Corp.'s 1708, 1736 Series, O-Z/Gedney Co.'s C-8T, 24-34T, ACV-50T Series, or Thomas & Betts Corp.'s Nylon Insulated Tite-Bite Series.
  8. Sealtite Connectors (For Liquidtight Flexible Metal Conduit): Appleton Electric Co.'s STB Series, Ideal Industries Inc. 75-521 Series, Midwest Electric Mfg. Corp.'s LTB Series, O-Z/Gedney Co.'s 4Q-50T Series, Raco Inc.'s 3512 Series, or Thomas & Betts Corp.'s 5332 Series.
- E. Conduit Bodies (Threaded): Appleton Electric Co.'s Unilets, Crouse-Hinds Co.'s Condulets, Gould Inc.'s Efcorlets, or O-Z/Gedney Co.'s Conduit Bodies.
- F. Sealing Fittings: Appleton Electric Co.'s EYS, ESU w/Apelco C sealing compound, Crouse-Hinds Co.'s EYS, EZS w/Chico A sealing compound, or accepted equal.
- G. Vertical Conductor Supports: Kellems Div. Harvey Hubbell Conduit Riser Grips, O-Z/Gedney Co.'s Type M, Type R, or accepted equal.
- H. Expansion Fittings:
1. Zinc Electroplate Finish: Appleton Electric Co.'s XJ, Crouse-Hinds Co.'s XJ, Midwest Electric Mfg. Corp.'s XJ, or OZ/Gedney Co.'s AX (TX for EMT), with external bonding jumper.
  2. Electrogalvanized Steel: Crouse Hinds Co.'s XJG, with internal grounding.
  3. Aluminum: OZ/Gedney Co.'s AX, with external bonding jumper.
- I. Deflection Fittings: Crouse-Hinds Co.'s XD, or OZ/Gedney Co.'s Type DX.
- J. Joint Compound for PVC Rigid Steel Conduit: Use to lubricate and protect threaded joints from corrosion and enhance conductivity. T&B Corp.'s Kopr-Shield Joint Compound or accepted equal.

## PART 3 - EXECUTION

### 3.1 RACEWAY INSTALLATION - GENERAL

- A. Number of Circuits in Raceway: Each raceway may enclose up to a maximum of three circuits unless otherwise indicated on the Drawings.
- B. Conduit Installed Concealed:
1. Install conduit for all circuit Work concealed in the floors, ceilings, walls, or partitions of the building unless otherwise indicated on the Drawings.

2. Route conduit in and under slab from point-to-point, as follows:
    - a.  $\frac{3}{4}$ " and smaller conduits may be installed in floor slabs on grade. Do not cross conduits in concrete slabs.
    - b. Conduits larger than  $\frac{3}{4}$ " in floor slabs on grade shall be run in depressions below slab bottom. Pour concrete around conduit before slab is poured.
  3. If any portions of the conduit system cannot be installed concealed due to field conditions encountered in the building, report such conditions to Architect and await acceptance in writing before proceeding.
- C. Conduit Installed Exposed:
1. Install vertical runs perpendicular to the floor.
  2. Install runs on the ceiling perpendicular or parallel to the walls.
  3. Install horizontal runs parallel to the floor.
  4. Do not run conduits near heating pipes. Maintain 12" clearance between conduit and surfaces with temperatures exceeding 104°F.
  5. Installation of conduit directly on the floor will not be permitted.
- D. Conduit Size: Not smaller than  $\frac{1}{2}$ " electrical trade size. For underground installations, not less than 1".
- E. Provide plastic or insulated bushings on all conduits prior to pulling conductors; no exceptions.
- F. Conduit Ends:
1. Arrange conduit terminations in cabinet with ends at the same level.
  2. Plug ends of conduits with caps to exclude dirt, moisture and other foreign material until wiring is installed.
  3. Use two locknuts and insulated bushing on end of each conduit entering cabinet or galvanized box (plastic bushing may be used on  $\frac{1}{2}$ " and  $\frac{3}{4}$ " conduit).
  4. Use conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.
  5. Use insulated grounding bushings on the ends of conduits that are not directly connected to the enclosure (such as stub-ups under equipment, etc.) and bond between bushings and enclosure with equipment grounding conductor.
  6. Use insulated grounding bushings or grounding wedges on ends of conduit for terminating and bonding equipment grounding conductors (when required) if cabinets or boxes are not equipped with grounding/bonding screws or lugs.
- G. Conduit Bends:
1. For  $\frac{1}{2}$ " and  $\frac{3}{4}$ " conduits, bends may be made with manual benders. For all conduit sizes larger than  $\frac{3}{4}$ ", manufactured or field fabricated offsets or bends with an accepted hydraulic bender may be used.
  2. Install no more than three 90-degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams.

- H. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers. Do not use other supports, ie. suspended ceilings, suspended ceiling supporting members, lighting fixtures, conduits, mechanical piping or mechanical ducts.
- I. Independently support conduit at 8 feet on centers. Support within 12 inches of changes of direction and within 12 inches of each enclosure to which connected.
- J. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.
- K. Fasten conduit supports to building structure and surfaces under provisions of Section 26 05 29, SUPPORTING DEVICES.
- L. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.
- M. Do not attach conduit to ceiling support wires.
- N. Arrange conduit to maintain headroom and present neat appearance.
- O. Provide suitable fittings to accommodate expansion and deflection where conduit crosses control and expansion joints.
- P. Provide suitable pull rope in each empty conduit except sleeves and nipples.
- Q. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods specified.
- R. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Cooperate with other trades in the location with roofing installation and with Conditions of Contract and as specified.
- S. Existing raceways may not be reused unless specifically noted on the Drawings.
- T. The Owner's Representative may prohibit the reuse of existing raceway at his/her discretion; in which case, the contractor shall provide the specified conduit.
- U. All new and reused exposed conduit shall be painted in accordance with Section 099100, Painting to match surrounding finished areas.
- V. Paint all fire alarm conduit red or provide pre-manufactured safety red conduit in unfinished areas, whether exposed or concealed.

### 3.2 FIRE-RATED CABLE/CONDUIT ASSEMBLY INSTALLATION

- A. Install special 2-hour fire-rated conduit cable in EMT or rigid steel conduit per Article 3.3 below and support cable and conduit assembly as specified in Section 260519, Article 3.5.

### 3.3 MAINTAINING FIRE RESISTANCE

- A. Conduit and equipment shall be firestopped to prevent the passage of flame, smoke, fumes and hot gases. Refer to Section 260510, FIRESTOPPING. Refer to Section 07841, Through-Penetration Firestop Systems.

### 3.4 RACEWAY SCHEDULE

- A. Rigid Steel Conduit: Install in all locations indicated on the Drawings, including:
  - 1. Conduit Stub-ups.
  - 2. In outdoor, above grade locations.
  - 3. All areas subject to mechanical damage or wet and damp locations.
  - 4. In underground installations, within five (5) feet from foundation wall.
  - 5. In crawlspace.
  - 6. In hazardous locations.
  - 7. Shall be installed for all emergency power systems in wet and damp locations, for mechanical protection per NFPA 99.
- B. Intermediate Metal Conduit:
  - 1. In all dry and damp locations.
  - 2. In crawlspace.
  - 3. In areas specifically noted.
- C. Steel Electrical Metallic Tubing:
  - 1. May be installed concealed for branch and feeder circuit conduits.
  - 2. May be installed concealed as branch circuit conduits in hollow areas in dry locations, including:
    - a. Hollow concrete masonry units, except where cores are to be filled.
    - b. Drywall construction with sheet metal studs, except where studs are less than 3½" deep.
  - 3. May be installed exposed in dry locations, in Mechanical and Electrical Rooms only.
  - 4. Shall be installed for all emergency power systems, for mechanical protection per NFPA 99.

D. Flexible Metal Conduit:

1. Use for final conduit connection to recessed lighting fixtures in suspended ceilings. Use not more than 4-6 feet of minimum ½" flexible metal conduit between junction box and fixture.
2. Use not more than 1-3 feet of flexible metal conduit for final conduit connection to:
  - a. Dry type transformers.
  - b. Motors with open, drip-proof or splash-proof housings.
  - c. Equipment subject to vibration (dry locations).
  - d. Equipment requiring flexible connection for adjustment or alignment (dry locations).
3. Install equipment grounding conductor in all flexible metal conduit and bond at each box or equipment to which conduit is connected.

E. Liquidtight Flexible Metal Conduit:

1. Use not more than 1-3 feet of liquidtight flexible metal conduit for final conduit connection to:
  - a. Motors with weather-protected or totally enclosed housings.
  - b. Equipment subject to vibration and in damp or wet locations.
  - c. Equipment requiring flexible connection for adjustment or alignment in damp or wet locations.
  - d. Lighting fixtures installed in "hard", gypsum type ceilings.
2. Install equipment grounding conductor in all liquidtight flexible metal conduit.

F. Rigid Nonmetallic Conduit:

1. Use for underground raceway systems more than five (5) feet from foundation wall, void of traffic. Refer to Section 26 05 43, UNDERGROUND CONDUIT SYSTEM.
2. In concrete slabs.
3. In corrosive environments, where indicated.

G. Wireways: May be used indoors in dry locations for exposed raceway between grouped, wall mounted equipment and where otherwise shown.

3.5 CONNECTOR AND COUPLING SCHEDULE

- A. For Rigid Steel and Intermediate Metal Conduit: Use threaded type connectors and couplings. Use 3 piece conduit coupling where neither piece of conduit can be rotated.
- B. For Steel Electrical Metallic Tubing: Provide insulated type connectors. Use gland and ring compression type for tubing size ½" to 1". Use compression type for tubing size 1¼" and larger. Die cast construction is prohibited.

- C. For Flexible Metal Conduit: Use flexible steel conduit connectors.
- D. For Liquidtight Flexible Metal Conduit: Use sealtite connectors.
- E. For Rigid Nonmetallic Conduit: Use conduit manufacturers standard connectors and couplings.

### 3.6 ADJUSTING AND CLEANING

- A. Upon completion of installation of raceways, inspect interiors of raceways; clear all blockages and remove burrs, dirt, and construction debris.

END OF SECTION 260533



## SECTION 260534 – SURFACE RACEWAYS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. The following Division 26 Section must be coordinated and included in the project.

1. SECTION 260533, RACEWAYS

#### 1.2 SUMMARY

- A. This Section includes surface raceways for electrical wiring. Types of raceways in this Section include the following:
1. Surface metal raceways.
  2. Surface non-metallic raceways.
  3. Multi-outlet assemblies.

#### 1.3 REFERENCES

- A. National Fire Protection Association (NFPA):

No. 70 National Electrical Code, the following Articles:

- |      |                              |
|------|------------------------------|
| 386, | Surface Metal Raceway.       |
| 388, | Surface Nonmetallic Raceway. |

- B. National Electrical Manufacturers Association (NEMA) Std Pub/No. WD 6 Wiring Device Configurations.

- C. NECA (National Electrical Contractor's Association) Standard of Installation.

#### 1.4 SUBMITTALS

- A. General: Submit the following products in accordance with Conditions of Contract and as specified.
- B. Product Data: Provide dimensions, knockout sizes and location, materials, fabrication details, finishes, and accessories.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

- D. Provide sample of each product if different from company or catalog number specified.

## 1.5 QUALITY ASSURANCE

- A. Electrical Component Standard: Components and installation shall comply with NFPA 70 "National Electrical Code."
- B. NEMA Compliance: Comply with applicable requirements of NEMA standards pertaining to raceways.
- C. UL Compliance and Labeling: Comply with applicable requirements of UL standards pertaining to electrical raceway systems. Provide raceway products and components listed and labeled by UL, ETL, or CSA.
- D. NECA Compliance: Perform Work in accordance with NECA Standard of Installation.

## 1.6 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on Drawings.
- B. Verify routing and termination locations of conduit prior to rough-in.
- C. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
  - 1. Thomas & Betts
  - 2. The Wiremold Company
  - 3. Isotrol Systems, Inc.
  - 4. Mono-Systems, Inc.
  - 5. Hubbell Incorporated

### 2.2 SURFACE METAL RACEWAY

- A. Enameled, sheet metal channel with fitted cover, suitable for use as surface metal raceway.

- B. Provide prepunched snap-on covers as required.
- C. Furnish manufacturer's standard couplings, fittings, bushings, boxes, connectors, elbows, wire clips, extension rings and other accessories to make a complete job.
- D. Ivory baked enamel finish.
- E. Surface Raceway, Fittings and Accessories: Walker 333, 888, 1700 Snap Cap Surface Raceway Systems, Wiremold 500, 700, 1000 series Surface Metal Raceway Systems, Mono-Systems SMS500, SMS700 series, or Hubbell HBL500, HBL700, HBL2000 series.

## 2.3 MULTI-OUTLET ASSEMBLIES

- A. Enameled steel type, two section combination assembly for power receptacles and communications (computer) outlets, or as otherwise indicated on Drawings.
- B. Ivory baked enamel finish.
- C. Raceway shall contain integral dividers for separating power receptacles from low voltage devices (i.e. telephone or computer outlets) as required.
- D. Unless otherwise noted, use devices specified in Section 262726. Telephone and computer cable openings shall have bushed openings. Locate all outlets as shown on Drawings.
- E. Provide all devices, plates, couplings, blank and fittings, entrance and wall connectors, inside and outside elbows, wire clips, knockouts, etc. as required to match layout shown on Drawings.
- F. As noted on Drawings, assembly shall be nominal 1-3/4" deep x 4-3/4" high with common snap-in, overlapping coverplate over both sections. Outlets shall be located as indicated on plans. Wiremold V-4000 Series with V4050 high impact plastic device mounting brackets and 5507 plates (ivory finish). Mono-Systems SMS4200 Series or Hubbell HBL4750 Series.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Provide in finished rooms of existing buildings where concealed conduit cannot be run, and were called for.
- B. Obtain acceptance from the Architect, for the installation and routing of surface raceway prior to beginning Work.

### 3.2 INSTALLATION

- A. Install Products in accordance with manufacturer's instructions.
- B. Use surface raceway system of size required for number of wires to be installed therein. Follow NEC for conductor fill, and derate conductors as required.
- C. Do not run raceway through walls which have a plaster finish nor through masonry walls or floors. Install a pipe sleeve, or a short length of conduit with junction boxes or adapter fittings for raceway runs through such areas. Run raceway along top of baseboards, care being taken to avoid telephone and other signal wiring. Where raceway crosses chair railing or picture molding, cut railing/molding to permit the raceway to lie flat against the wall. Run raceway around door frames and other openings. Run raceway on ceiling or walls perpendicular to or parallel with walls and floors.
- D. Cooperate with others, when the installation occurs adjacent to counters, chalkboards, doors, cabinets, shelving, finned radiation, unit ventilators, etc.
- E. Secure surface raceway and multi-outlet assemblies at intervals not exceeding 36". Use flat-head screws, clips, and straps to fasten raceway channel to surfaces. Mount plumb and level.
- F. Provide bushings at every open end of raceway where it enters a fitting to protect wiring from abrasion.
- G. Install separate equipment grounding conductor for grounding of equipment. The raceway alone will not be considered suitable for use as an effective path to ground.
- H. Where equipment is mounted on an outlet box and the equipment base is larger than the outlet box, provide finishing collar around equipment base and outlet box or provide finishing collar/outlet box:
  - 1. Finishing Collar: Same finish and peripheral dimensions as the equipment base, including provisions for mounting, slots to fit over raceway and of depth to cover outlet box and extend back to ceiling or wall.
  - 2. Combination Finishing Collar/Outlet Box: Same finish and peripheral dimensions as the equipment base to be mounted thereon, gauge or thickness of metal as required by the National Electrical Code, including provision for mounting and knockouts for entrance of raceway.

### 3.3 FITTINGS AND ACCESSORIES

- A. Use raceway manufacturer's standard fittings, connectors and couplings.

END OF SECTION 260534

## SECTION 260553 – ELECTRICAL IDENTIFICATION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Identification of Electrical products, equipment and conduit and cable systems installed under Division 26, including but not limited to the following:
  - 1. Buried electrical line warnings.
  - 2. Identification labeling for raceways, cables, conductors and wall plates.
  - 3. Operational instruction signs.
  - 4. Warning and caution signs.
  - 5. Equipment labels and signs.
  - 6. Ceiling markers for accessible devices.
- B. Provide identification on all equipment, raceways, boxes, conductors and devices. Electrical identification includes, but is not limited to, warning signs, nameplates, cable tags, wire markers, phase identification tape, identification labels and nominal system voltage designation labels.
- C. Electrical identification shall be permanent, machine printed, appropriately sized and provided such that it is easily read upon approach or within enclosures.

#### 1.2 REFERENCES

- A. ANSI/ASME A13.1 – Scheme for the Identification of Piping Systems.
- B. NFPA 70 – National Electrical Code.
- C. Other Division 26 Sections for additional specific electrical identification associated with specific items.

#### 1.3 SUBMITTALS

- A. Submit product data for electrical identification.
- B. Submit list of wording, symbols, letter size, and color coding for electrical identification.
- C. Submit schedule with type of identification to be utilized for each system.

- D. Submit shop drawings, depicting special nomenclature for instructions, control-by-event or explanation of systems operations for:

1. Switchgear.
2. Switchboards.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Allen Systems Inc.
2. American Labelmark Co.
3. Calpico, Inc.
4. Cole-Flex Corp.
5. Emed Co., Inc.
6. George-Ingraham Corp.
7. Glen Ellen, Inc.
8. Ideal Industries, Inc.
9. Kraftbilt
10. LEM Products, Inc.
11. Markal Corp.
12. National Band and Tag Co.
13. Panduit Corp.
14. Radar Engineers Div., EPIC Corp.
15. Seton Name Plate Co.
16. Standard Signs, Inc.
17. W.H. Brady Co.

### 2.2 MATERIALS

- A. Adhesive Marking Labels for Raceways: Pre-printed, flexible, self-adhesive labels with legend indicating Voltage and service (EMERGENCY, LIGHTING, POWER, LIGHT, POWER D.C., AIR CONDITIONING, COMMUNICATIONS, CONTROL, FIRE ALARM, etc.).

1. Label Size: as follows:
  - a. Raceways 1 Inch and Smaller: 1-1/8 inches high by 4 inches long.
  - b. Raceways Larger than 1 Inch: 1-1/8 inches high by 8 inches long.
2. Color: Black legend on orange background.

- B. Underground Line Marking Tape: Warning tape of continuous lettering and capable of being identified by a metal detector.
1. For electrical Work, provide 6 inch wide, detectible heavy gauge, 4.5 mil red polyethylene with solid aluminum foil core labeled with black letters "CAUTION BURIED ELECTRIC LINE BELOW"; equal to Seton Identification Products Item #85517, or accepted equal by Craftmark Identification Systems, Kolbi Pipe Marker Co., or Panduit.
  2. For high Voltage Work, provide 6 inch wide, detectible heavy gauge, 4.5 mil red polyethylene with solid aluminum foil core labeled with black letters "CAUTION BURIED HIGH VOLTAGE LINE BELOW"; equal to Seton Identification Products Item #85520, or accepted equal by Craftmark Identification Systems, Kolbi Pipe Marker Co., or Panduit.
  3. For communication Work, provide 6 inch wide, detectible heavy gauge, 4.5 mil orange polyethylene with solid aluminum foil core labeled with black letters "CAUTION, BURIED COMMUNICATION LINE BELOW", equal to Seton Identification Products Item #85516, or accepted equal by Craftmark Identification Systems, Kolbi Pipe Marker Co., or Panduit.
  4. For fiber optic Work, provide 6 inch wide, detectible heavy gauge, 4.5 mil orange polyethylene with solid aluminum foil core labeled with black letters "CAUTION, BURIED FIBER OPTIC CABLE BELOW", equal to Seton Identification Products Item #85518, or accepted equal by Craftmark Identification Systems, Kolbi Pipe Marker Co., or Panduit.
  5. For telecommunications Work, provide similar marking tape as above, except 3" wide, orange in color and labeled with black letters "CAUTION BURIED CABLE LINE BELOW", equal to Seton Identification Products Item #85505, or accepted equal by Craftmark Identification Systems, Kolbi Pipe Marker Co., or Panduit.
- C. Wire/Cable Designation Tape Markers: Vinyl or vinyl-cloth, self-adhesive, wraparound, cable/conductor markers with preprinted numbers and letter.
- D. Aluminum, Wraparound, Cable Marker Bands: Bands cut from 0.014 inch thick, aluminum sheet, fitted with slots or ears for securing permanently around wire or cable jacket or around groups of conductors. Provide for legend application with stamped letters or numbers.
- E. Plasticized Card Stock Tags: Vinyl cloth with preprinted and field-printed legends to suit the application. Orange background, except as otherwise indicated, with Eyelet for fastener.
- F. Baked-Enamel Warning and Caution Signs for Interior Use: Preprinted aluminum signs, punched for fasteners, with colors, legend, and size appropriate to the location and use.
- G. Exterior Metal-Backed Butyrate Warning and Caution Signs: Weather-resistant, nonfading, preprinted cellulose acetate butyrate signs with 20-gauge, galvanized steel backing, with colors, legend, and size appropriate to the location and use. Provide 1/4-inch grommets in corners for mounting.

- H. Fasteners for Metal Signs: Self-tapping stainless-steel screws or number 10/32 stainless steel machine screws with nuts and flat and lock washers.
- I. Adhesive Ceiling Grid Marking Labels: Pre-punched, colored labels of size, shape, color and preprinted identifications determined by Owner.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials and for stencil painting.

### 3.2 INSTALLATION

- A. Lettering and Graphics: Coordinate names, abbreviations, colors, and other designations used in electrical identification work with corresponding designations specified or indicated. Install numbers, lettering, and colors as approved in submittals and as required by code.
- B. Install identification devices in accordance with manufacturer's written instructions and requirements of NEC.
- C. Sequence of Work: Where identification is to be applied to surfaces that require finish, install identification after completion of finish Work.
- D. Emergency Lighting Fixtures and Automatic Load Control Relays:
  - 1. Provide identification labels attached to the fixtures so they are readily discernible by a person standing on the normal walking surface in the area, for testing purposes.
- E. Switchboards, Panelboards, Equipment Cabinets, Control Panels, Generators, Uninterruptible Power Supplies, Disconnect Switches, Enclosed Circuit Breakers and Motor Controllers: Raceway Identification:
  - 1. Provide nameplate with equipment identification as indicated on Drawings.
  - 2. Indicate source and location of the source.
  - 3. Provide nominal system voltage designation labels on cover.
  - 4. For disconnect switches and enclosed circuit breakers, indicate the equipment designation and location which the disconnect serves.
  - 5. For motor controllers, indicate the motor designation, location and the type of service.



F. Transfer Switches:

1. Provide nameplate with equipment identification as indicated on Drawings.
2. Indicate equipment designation and location which the transfer switch serves.
3. Indicate normal and standby/emergency sources and locations of the sources.
4. Provide nominal system voltage designation labels on cover.

G. Raceway Identification:

1. Low Voltage Raceways: Identify each exposed raceway shown on the single line riser diagram every 20 feet with the installed conductor operating voltage and distribution system designation using adhesive marking labels. Use red base for emergency feeders and black base for normal feeders. (ie. 208 VOLT LIFE SAFETY, 480 VOLT GENERAL, 240 VOLT NORMAL, 277 VOLT EMERGENCY, etc.).
2. Clean surface of dust, loose material, and oily films before applying adhesive labels.
3. Empty Conduit Runs and Conduits with Conductors for Future Use:
  - a. Provide cable tags and identification labels.
  - b. Indicated proposed future use.
  - c. Label conduits and conductors at both ends, including location of the other end.

H. Identify Junction Boxes, Pull Boxes and Enclosures: Code-required caution sign for boxes shall be pressure-sensitive, self-adhesive label indicating nominal system voltage with feeder, branch circuit and control circuit numbers in black, preprinted on orange background. Install on outside of box cover. Also label box covers with identity of contained branch circuits, feeders and control circuits, the sources and locations of the sources and the loads and locations of the loads served.

I. Device Wall Plate Identification: Engrave normal and emergency powered devices with 1/8-inch-high black capital letters designating as follows:

1. Other than NEMA 5-20R receptacles shall be engraved with the following:
  - a. Voltage
  - b. Number of phases.
  - c. Current rating.
  - d. Example: "208/3P/50A".
2. Emergency NEMA 5-20R receptacles shall be engraved with the following branch circuit source information, unless otherwise noted elsewhere in these specifications:
  - a. "EMERGENCY".
  - b. Panelboard number.
  - c. Circuit number.
  - d. Example: "EMERGENCY/1LSL1-3"

3. Receptacles protected upstream on associated branch circuit by a ground fault circuit interrupter device shall be engraved "GFCI PROTECTED".
  4. Switch used as equipment or motor disconnect shall be engraved "Disconnect/ (Device Designation)" (i.e. "Disconnect/Ice Machine", "Disconnect/D4-EF01", etc.).
  5. Special systems/communication systems devices (ie. fire phone receptacles) shall be engraved designating device type per Owner representative requirements (ie. FIREPHONE, DATA, TEL, TV, etc.).
  6. Wiring device circuit identification for NEMA 5-20R receptacles other than emergency use NEMA 5-20R receptacles: Use permanent marker to identify circuit and panelboard number on back of wall plate.
- J. Underground Electrical or Communications Line Identification: During trench backfilling, for exterior underground power, signal, and communications lines, install continuous underground line marker located directly above full length of ductbank and approximately 12 inches below finished grade. Use metallic detection type for all underground installations. Where multiple types of lines are installed in a common trench or concrete envelope, install multiple line markers.
- K. Cable and Conductor Identification: Securely fasten identifying metal tags of aluminum wraparound marker bands to cables, feeders, and power circuits in vaults, pull boxes, junction boxes, manholes, and switchboard rooms with 1/4-inch steel letter and number stamps with legend to correspond with designations on Drawings. If metal tags are provided, attach them with approximately 55-lb test monofilament line or one-piece self-locking nylon cable ties.
1. Tag or label conductors as follows:
    - a. Future Connections: Conductors indicated to be for future connection or connection under another contract with identification indicating source and circuit numbers.
    - b. Multiple Circuits: Where multiple branch circuits or control wiring or communications/signal conductors are present in the same box or enclosure (except for three-circuit, four-wire home runs), label each conductor or cable. Provide legend indicating source, voltage, circuit number, and phase for branch circuit wiring. Phase and voltage of branch circuit wiring may be indicated by means of coded color of conductor insulation. For control and communications/ signal wiring, use color coding or wire/cable marking tape at terminations and at intermediate locations where conductors appear in wiring boxes, troughs, and control cabinets. Use consistent letter/number conductor designations throughout on wire/cable marking tapes.
    - c. Match identification markings with designations used in panelboards shop drawings, Contract Documents, and similar previously established identification schemes for the facility's electrical installations.
  2. For exterior circuits, include identification of the building from which it originates.

L. Apply warning, caution, and instruction signs and stencils as follows:

1. Install warning, backfeed warning, caution, flash protection, or instruction signs where required by NEC, where indicated, or where reasonably required to assure safe operation and maintenance of electrical systems and of the items to which they connect.
2. Emergency Operating Signs: Install engraved laminate signs with white legend on red background with minimum 3/8-inch-high lettering for emergency instructions on power transfer, load shedding, or other emergency operations.
3. Fused and Non-Fused Motor Disconnect Switches: Install engraved laminate signs with white legend on red background with minimum 3/8-inch-high lettering with the following designation - "DANGER, DO NOT START OR STOP MOTOR WITH THIS SWITCH. USE FOR ISOLATION ONLY".

M. Install equipment/system circuit/device identification as follows:

1. Apply equipment identification labels of engraved plastic-laminate on each major unit of electrical equipment in building, including central or master unit of each electrical system. This includes communication/signal/alarm systems, unless unit is specified with its own self-explanatory identification. Except as otherwise indicated, provide single line of text, with 1/2-inch-high lettering on 1-1/2-inch-high label (or larger where multiple lines are required), white lettering in black field designating the equipment served. Utilize red field for equipment connected to an emergency source or fire alarm system. Text shall match terminology and numbering of the Contract Documents and shop drawings. Electrical equipment nameplates shall also designate line side source (i.e. FED FROM "\_\_\_\_\_" LOCATED IN ROOM "\_\_\_\_") in smaller 1/4 inch lettering. Smaller nameplate lettering may be used where adequate nameplate mounting space is not available, but in no case shall the lettering be smaller than 1/8-inch. Apply labels mechanically with machine screws or pop rivets for each unit of the following categories of electrical equipment for electrical equipment and panelboard designations.
  - a. Automatic transfer switch.
  - b. Battery chargers.
  - c. Boxes (Pull, Junction, or Branch Circuit) when given specific designation on drawings.
  - d. Clock master control center.
  - e. Communication/special systems cabinets and backboards.
  - f. Contactors.
  - g. Control devices.
  - h. Disconnect switches.
  - i. Distribution panelboards protective devices.
  - j. Emergency generator set.
  - k. Emergency power off (EPO) stations.
  - l. Fire alarm system field processing units, terminal cabinets, peripheral monitor and control modules, fire phone cabinets and remote duct detector test stations.
  - m. Generator tool kit cabinets.
  - n. Ground buses and terminal bars.

- o. Low voltage relay panels.
  - p. Motor controllers.
    - (1) Designate motor function (i.e. "CW Pump No. P-1"), not "P-1".
  - q. Main overcurrent device or main lug section and motor controllers in motor control centers.
  - r. Other systems.
  - s. Panelboards.
  - t. Pushbuttons.
  - u. Strip terminal cabinets.
  - v. Security panels.
  - w. Single-pole switches and fractional horsepower manual starters used for motor disconnect switch.
  - x. Separately mounted circuit breakers.
  - y. Standard telecommunication system.
  - z. Transformers.
- 2. Refer to appropriate sections for other nameplate and device plate marking requirements and nomenclature.
  - 3. Attach nameplates mechanically after finish painting.

N. Ceiling Markers For Accessible Devices:

- 1. Furnish and install punched color tape markers, or color coded markers as determined by Owner. Affix to ceiling grid or to access panel to indicate which ceiling or access panel is to be removed to obtain access to control/monitoring devices, duct mounted smoke detectors, system type occupancy sensor control units, etc.

O. Fire Alarm:

- 1. Fire alarm junction boxes and pull fittings shall be painted to identify them as components of the fire alarm system as compared to other systems. Red is the typical paint color for the fire alarm system components, although the color should match the Owner's standards.
- 2. Remote Smoke Detector Lamps and Test Stations: Provide nameplate indicating the location of the connected device.
- 3. Initiation Devices, Notification Appliances and Fire Alarm Relays: Provide device identification and address identification label.

P. Communications:

- 1. Comply with applicable EIA, TIA and ANSI Standards.
- 2. Equipment Cabinets, Terminal Cabinets, Control Panels, Patch Panels and Racks: Provide nameplates with equipment identification and label termination blocks and ports.
- 3. Data Outlets: Provide device identification label on faceplate. Identify equipment designation and location from which it originates.
- 4. Label per Owner's standards and direction.

- Q. Security: Provide device identification labels and identify equipment designation and location from which it originates.
- R. Install labels at locations indicated and at locations for best convenience of viewing without interference with operation and maintenance of equipment.

END OF SECTION 260553

## SECTION 260923 - AUTOMATIC LIGHTING CONTROLS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. The following Division 26 Section must be coordinated and included in the project.

- 1. SECTION 262726, WIRING DEVICES

#### 1.2 SUMMARY

- A. Extent of lighting and receptacle control equipment Work is indicated by Drawings.
- B. Types of lighting and receptacle control equipment specified in this section include the following:
  - 1. Analog Devices
    - a. Ceiling Occupancy/Vacancy Sensors
    - b. Wall Mount Occupancy/Vacancy Sensors
    - c. Low Voltage Switches
    - d. 0-10 Volt Dimmers
    - e. Room Controllers

#### 1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's data on control equipment and components.
- B. Shop Drawings: Submit layout Drawings of control equipment and components.
- C. Wiring Diagrams: Submit wiring and/or schematic diagrams for control equipment and components showing control and interconnection wiring, including connections to equipment components and electrical power feeders. Differentiate between portions of wiring that are manufacturer-installed and portions that are field-installed.
- D. Maintenance Manuals: Furnish maintenance manuals that contain equipment cuts, operating instructions, troubleshooting procedures, and spare parts list for equipment. Ensure manual includes operating instructions in addition to instructions for maintenance of the system.

#### 1.4 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of control equipment and ancillary equipment, of types, ratings and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer's Qualifications: Firm with at least five successfully completed projects of similar scope.
- C. Codes and Standards:
  - 1. Electrical Code Compliance: Comply with applicable local electrical code requirements of the Authority Having Jurisdiction and NEC as applicable to construction, installation of lighting control and communications equipment.
  - 2. UL Compliance: Provide lighting control equipment and components that are UL-listed and labeled.
  - 3. NEMA Compliance: Comply with applicable requirements of NEMA's Stds Pub No. 250, "Enclosures for Electrical Equipment (1000-Volts Maximum)."
  - 4. International Energy Conservation Code.
  - 5. ANSI/ASHRAE/IESNA 90.1 requirements.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver control equipment and components in factory-fabricated type containers or wrappings, which properly protect equipment from damage.
- B. Store control equipment in original packaging and protect from weather and construction traffic.
- C. Handle control equipment carefully to prevent physical damage to equipment and components. Do not install damaged equipment; remove from site and replace damaged equipment with new.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Provide indoor control equipment of one of the following (for each type and rating of equipment):
  - 1. Legrand Wattstopper, Inc. (Basis of Design)
  - 2. Eaton Greengate.
  - 3. Hubbell Control Solutions

## 2.2 INTERIOR LIGHTING CONTROL DEVICES - ANALOG

- A. General: Provide factory fabricated occupancy/vacancy sensor controls consisting of passive infrared and/or ultrasonic motion which scans an area in search of changes in temperature and/or motion caused by the presence, or absence, of people within the desired viewing area. When no presence is detected for a period of up to 20 minutes, the lights are switched off.
- B. Dual Technology Ceiling Mounted Sensors (Type C1 and VS):
1. Unit shall feature 360 degree viewing angle, with square feet of viewing area as noted below.
  2. Capable of switching both solid-state electronic and LED loads, UL listed.
  3. Load capacity as required per individual room arrangement; provide additional power packs when wattage to be controlled exceeds that specified for control unit.
  4. Finish shall be white.
  5. Equip with all necessary control units, relays, powerpacks, backboxes, mounting plates, etc. for complete operation.
  6. Acceptable dual technologies consist of combination of passive infrared and ultrasonic detection.
  7. Sensor shall be low voltage type with power pack rated for 120/277 VAC operation. Power pack shall be rated for amperage as determined by load to be switched.
  8. Sensors shall utilize Dual Sensing Verification Principle for coordination between ultrasonic and PIR technologies. Detection of both technologies must occur in order to activate lighting systems. Upon verification, detection by either shall hold lighting on.
  9. Ultrasonic sensing shall be volumetric in coverage with a frequency of 40 KHz. It shall utilize Advanced Signal Processing that automatically adjusts the detection threshold dynamically to compensate for changing levels of activity and airflow throughout controlled space.
  10. The PIR technology shall utilize a temperature compensated, dual element sensor and a multi-element Fresnel lens. The lens shall be Poly IR4 material to offer superior performance in the infrared wavelengths and filter short wavelength IR, such as those emitted by the sun and other visible light sources. The lens shall have grooves facing in to avoid dust and residue build up which affects IR reception.
  11. Unit shall have dip switches for changing from automatic on (occupancy sensor) to manual on (vacancy sensor) as indicated on drawings.
  12. Acceptable Manufacturers:
    - a. Legrand Wattstopper: DT-300 Series
    - b. Eaton Greengate: DAC-DT Series
    - c. Hubbell Control Solutions: OMNI DT series



## 2.3 LOW VOLTAGE DIMMING WALL SWITCH (SINGLE POLE AND 3-WAY)

- A. UL 60730-1 listed switching station providing stand-alone manual control and 0-10V dimming.
- B. Momentary switch function for vacancy sensor application.
- C. Low voltage, 24 VDC compatible with occupancy sensor power pack.
- D. Color to match switch/receptacles specified in Section 262726.
- E. 5 year warranty.
- F. Acceptable Manufactures:
  - 1. Legrand Wattstopper: LM DM
  - 2. Hubbell Control Solutions: LVDS
  - 3. Sensor Worx: SWX-803.
  - 4. Sensor Switch: sPODM-SA-D

## 2.4 WIRED DISTAL LOAD CONTROLLERS

- A. Wired On/Off/0-10V Dimming Enhanced Room Controllers for:
  - 1. Dual voltage (120/277 VAC, 50/60 Hz) capable or 347 VAC, 50/60 Hz 120/277 volt models rated for 20A total load; 347 volt models rated for 15A total load.
  - 2. Current monitoring via transducer.
  - 3. One, two or three relay configurations.
  - 4. Smart 250 mA switching power supply.
  - 5. Conduit adaptor available for applications where all wiring must be in conduit.
  - 6. Four FJ-45 DLM local network ports. Provide integral strain relief.
  - 7. One dimming output per relay
    - a. 0-10V Dimming – Where indicated, 0-10 volt analog input per relay for control of compatible ballasts and LED drivers. Units shall include a complimentary UL 924 rating for the ability of the 0-10 volt input to automatically open upon loss of power to the Room Controller to assure full light output from lighting connected to the 0-10V signal and powered by a live line voltage circuit.
  - 8. Wattstopper product numbers: LMRC-111, LMRC-212, or LMRC-213, or approved equal.

## 2.5 EMERGENCY LIGHTING CONTROL DEVICES

- A. Emergency Lighting Control Unit – A UL 924 listed device that monitors a switched circuit providing normal lighting to an area. The unit provides ON/OFF control of emergency lighting based on status of associated normal lighting. Upon normal power failure the emergency lighting relay will close, forcing the emergency lighting ON until normal power is restored. Features include:
1. 120/277 volts, 50/60 Hz, 20-amp ballast rating
  2. Push to test button.
  3. Auxiliary contact for remote test or fire alarm system interface.
- B. Wattstopper product numbers: ½ inch KO Mount: ELCU-200, or approve equal.

## 2.6 WIRED DIGITAL WALL SWITCHES

- A. Low voltage momentary pushbutton switches in multiple button and rocker configurations. Wall switches shall include the following features:
1. Buttons are used to control loads in a room, trigger scenes in a room, or control a network group of loads across the project (requires room to room network). Rockers are used to raise or lower the level of loads in a room.
  2. Two-way infrared (IR) transceiver for use with personal and configuration remote controls.
  3. Removable buttons/rocker insert for field replacement with engraved and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall, only the switch plate.
  4. Configuration LED on each switch that blinks to indicate data transmission.
  5. Load/Scene Status LED on each switch button with the following characteristics:
    - a. Bi-level LED
    - b. Dim locator level indicates power to switch
    - c. Bright status level indicates that load or scene is active
    - d. Dimming switches shall include even bi-level LEDs to indicate load levels using 14 steps.
  6. Programmable control functions include:
    - a. Load or Network Group Buttons may be configured to use a non-standard BACnet priority level, from 1-16, allowing local actions to utilize force on or functions associated with the other priority levels.
    - b. Scenes may be saved to any button other than dimming rockers. Once set, individual buttons may be digitally locked to prevent overwriting of the preset levels by an occupant in the room.
  7. All digital parameter data programmed into an individual wall switch shall be retained in non-volatile FLASH memory within the wall switch itself. Memory shall have an expected life of no less than 10 years.

- B. BACnet object information shall be available for the following objects:
  - 1. Button state
  - 2. Switch lock control
  - 3. Switch lock status
- C. Two RJ-45 ports for connection to DLM local network.
- D. Multiple digital wall switches may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration shall be required to achieve multi-way switching.
- E. Load and Scene button function may be reconfigured for individual buttons from Load to Scene, and vice versa.
  - 1. Individual button function may be configured to Toggle, On only (raise when held), Off only (lowered when held), or Toggle Dim (toggles between press and hold to raise, release, then press and hold to lower).
  - 2. Wall switches that include one or more rockers in addition to pushbuttons will allow occupants to raise or lower light level with the rocker. Rocker to be pre-engraved with down and up arrows to allow users to easily discern the rocker's function.
  - 3. Individual scene buttons may be locked to prevent unauthorized change.
  - 4. Fade Up and Fade Down times for individual scenes may be adjusted from 0 seconds to 18 hours in preset intervals.
  - 5. Ramp rate may be adjusted for each dimmer.
  - 6. Switch buttons and rockers may be bound to any load on any load controller or relay panel and are not load type dependent; each may be bound to multiple loads.
- F. Wattstopper product numbers: Standard 200 Series, LMSW210, LMSW211, LMSW-250. Available in white, light almond, ivory, grey, red and black; compatible with wall plates with decorator opening. All engraving and color requirements shall be called out on Reflected Ceiling plans.

## 2.7 WIRED DIGITAL WALL OR CEILING MOUNTED OCCUPANCY SENSOR

- A. Wired Digital Occupancy Sensors with two-way digital communications to Lighting Control system. Provide sensors of quantity and type to meet specific room applications. Features include the following:
  - 1. Digital communication and pushbutton configuration of the following variables:
    - a. Sensitivity, 0-100 percent in 10 percent increments
    - b. Time delay, 1-30 minutes in 1 minute increments
    - c. Test mode, Five second time delay
    - d. Detection technology, PIR, Ultrasonic or Dual Technology activation and/or reactivation
    - e. Walk-through mode
  - 2. Load parameters settings include Auto or Manual-ON and blink warning.

3. Programmable control functions include:
    - a. Each sensor may be programmed to control specific loads within a local network.
    - b. Sensor shall be capable of activating one of 16 user-definable lighting scenes or implementing a Partial on or Partial Off Sequence of Operation.
    - c. Adjustable retrigger time period for manual-on loads. Load will retrigger (turn on) automatically within a configurable period (default 10 seconds) after turning off to gracefully allow occupants in the space to bring their lights back on.
    - d. On dual technology sensors, independently configurable trigger modes are available for both Normal (NH) and After Hours (AH) time periods. The trigger and retrigger modes can be programmed to use the following technologies options:
      - 1) Ultrasonic and Passive Infrared
      - 2) Ultrasonic or Passive Infrared
      - 3) Ultrasonic only
      - 4) Passive Infrared only
    - e. Independently configurable sensitivity settings for passive infrared and ultrasonic technologies (on dual technology sensors) for both normal and After Hour time period.
  4. One or two RJ-45 port (s) for connection to DLM local network.
  5. Two-way infrared (IR) transceiver to allow remote programming through handheld commissioning tool and control by remote personal controls.
  6. Device Status LEDs, which may be disabled for selected applications, including:
    - a. PIR detection
    - b. Ultrasonic detection
    - c. Configuration mode
    - d. Load binding
  7. Optional lens configurations for the PIR only Wall and Ceiling sensors to allow coverage of longer ranges, 1 way or 2 way aisles, higher density coverage in smaller areas, or mounting up to 40 foot heights.
  8. Assignment of occupancy sensor to a specific load within the room without wiring or special tools.
  9. Manual override of controlled loads is permitted.
  10. All digital parameter data programmed into an individual occupancy sensor shall be retained in non-volatile FLASH memory within the sensor itself. Memory shall have an expected life of no less than 10 years.
- B. BACnet object information shall be available for the following objects:
1. Detection state for each sensor
  2. Detection state for all sensors in room (room status)
  3. Occupancy sensor time delay
  4. Occupancy sensor sensitivity, PIR and Ultrasonic

- C. Units shall not have any dip switches or potentiometers for field settings.
- D. Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required.
- E. Wattstopper product numbers: LMDC-100, or approval equal.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and conditions under which control equipment is to be installed and notify Architect in writing of conditions detrimental to proper completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION OF CONTROL EQUIPMENT

- A. Install control system components and ancillary equipment as indicated, in accordance with equipment manufacturer's written instructions, and with recognized industry practices, to ensure that lighting control equipment complies with requirements. Comply with requirements of NEC, and applicable portions of NECA's "Standard of Installation" pertaining to general electrical installation practices.
- B. Coordinate with other electrical Work, including raceways, and electrical boxes and fittings, as necessary to interface installation of lighting control equipment Work.

### 3.3 INSTALLATION OF MOTION SENSOR CONTROLS

- A. All units shall be secured to an outlet box and per manufacturer's written installation instructions; Drawings are for informational purposes only. Manufacturer shall have field-trained rep available to assist Contractor during installation.
- B. All necessary wiring diagrams shall be furnished to Contractor by manufacturer for installation.
- C. All sensors shall be adjusted in field to pick up door swing within range of viewer; Contractor shall adjust or move device as required.
- D. Provide all necessary control units, relays, wallplates, mounting brackets, filters, sensor covers, backboxes and other equipment necessary to make completely operational system. All equipment but sensor shall be recess mounted, concealed.

- E. All control units shall be wired such that wall switches (if present) can switch room lamps off. Program occupancy sensor control so that the occupant is required to manually turn ON the lights when re-entering the room, in compliance with the Energy Conservation Construction Code.
- F. Provide all required additional sensors for complete room coverage as required by system.
- G. Provide complete written checkout signed by manufacturer's representative, Contractor and Owner's Site Representative after complete installation of system.
- H. All occupancy sensor wiring, including both power and control wiring, shall be installed in raceway systems as specified.
- I. Wire vacancy sensors so that lighting shuts off at or less than 15 minutes after the occupant leaves the room. It will be necessary for the occupant to manually turn the lights back on.

### 3.4 PERSONNEL TRAINING

- A. Building Operating Personnel Training: Train Owner's building personnel in procedures for starting-up, testing and operating lighting control system equipment.
- B. Provide two 1-hour sessions to train facility personnel on the use, operation and maintenance of the system.

### 3.5 COMMISSIONING

- A. A registered design professional shall provide evidence that the lighting control systems have been tested to:
  - 1. Confirm occupancy sensors acceptable performance of placement, sensitivity and settings.
  - 2. Confirm time switches and schedule controls are correctly programmed, functioning and documented.
  - 3. Confirm daylighting responsive controls are properly located, calibrated, accessible and function to adjust lighting in response to available daylight.
  - 4. Submit documentation certifying performance.

END OF SECTION 260923

## SECTION 262716 – OUTLET JUNCTION AND PULL BOXES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes wall and ceiling outlet boxes, junction boxes, pull boxes, cabinets and fittings for electrical installations and certain types of electrical fittings not covered in other Sections. Types of products specified in this Section include:
1. Outlet and device boxes.
  2. Pull and junction boxes.
  3. Cabinets.
  4. Fittings

#### 1.2 REFERENCES

- A. National Fire Protection Association (NFPA):
- |         |   |
|---------|---|
| NFPA 70 | National Electrical Code, including the following Articles: |
| 300,    | Wiring Methods.   |
| 312,    | Cabinets, Cutout Boxes and Meter Socket Enclosures.         |
| 314,    | Outlet, Device, Pull, and Junction Boxes.                   |
- B. National Electrical Manufacturers Association (NEMA)
- |           |  |
|-----------|--|
| NEMA OS 1 | Sheet-Steel Outlet Boxes, Device Boxes, Covers and Box Supports. |
| NEMA 250  | Enclosures for Electrical Equipment (1000 Volts Maximum).        |
- C. Underwriters Laboratories, Inc. (UL):
- |         |  |
|---------|--|
| UL 50   | Electrical Cabinets and Boxes.         |
| UL 514A | Electrical Metallic Outlet Boxes.      |
| UL 514B | Fittings for Conduit and Outlet Boxes. |

#### 1.3 DEFINITIONS

- A. Cabinets: An enclosure designed either for surface or for flush mounting and having a frame, or trim in which a door or doors may be mounted.
- B. Device Box: An outlet box designed to house a receptacle device or a wiring box designed to house a switch.
- C. Enclosure: A box, case, cabinet, or housing for electrical wiring or components.

- D. Hinged Door Enclosure: An enclosure designed for surface mounting and having swinging doors or covers secured directly to and telescoping with the walls of the box.
- E. Outlet Box: A wiring enclosure where current is taken from a wiring system to supply utilization equipment.
- F. Wiring Box: An enclosure designed to provide access to wiring systems or for the mounting of indicating devices or of switches for controlling electrical circuits.

#### 1.4 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for cabinets and enclosures with classification higher than NEMA 1.
- C. Shop drawings for outlet boxes, junction boxes, and pull boxes, enclosures and cabinets that are to be shop fabricated, (nonstock items). For shop fabricated junction and pull boxes, show accurately scaled views and spatial relationships to adjacent equipment. Show box types, dimensions, and finishes.

#### 1.5 QUALITY ASSURANCE

- A. UL Listing and Labeling: Items provided under this Section shall be listed and labeled by UL.
- B. National Electrical Code Compliance: Components and installation shall comply with NFPA 70 "National Electrical Code".
- C. NEMA Compliance: Comply with NEMA Standard 250, "Enclosures for Electrical Equipment (1000 Volts Maximum)".

#### 1.6 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on Drawings.
- B. Verify exact locations of all outlet boxes prior to rough-in. Pay particular attention to walls on which both outlet boxes for receptacles and finned tube radiation are located; cooperate with Division 23.
- C. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Install at location required for box to serve intended purpose.



## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
1. Cabinets:  
Electric Panelboard, Inc.  
Erikson Electrical Equipment Co.  
Hoffman Enclosures, Inc.  
Parker Electrical Mfg. Co.  
Spring City Electrical Mfg. Co.  
Square D Co.
  2. Boxes and Fittings:  
Adalet-PLM.  
Cooper Industries, Inc.  
Killard Electric Mfg. Co.  
O-Z/Gedney.  
Robroy Industries, Inc.  
Raco  
Spring City Electrical Mfg. Co.  
Thomas & Betts  
Woodhead Industries, Inc.

### 2.2 OUTLET, JUNCTION AND PULL BOXES

- A. Galvanized Steel Outlet Boxes: Standard galvanized steel boxes and device covers as manufactured by Appleton Electric Co., Electrical Products Div., Midland-Ross (Steel City), or Raco Inc.
- B. Galvanized Steel Junction and Pull Boxes: Code gauge, galvanized steel screw cover boxes as manufactured by Gray Metal Products Inc., Hoffman Enclosures, Inc., Keystone Columbia Inc., or Queen Products Co. Inc.
- C. Threaded Type Boxes:
1. Outlet Boxes:
    - a. Zinc Electroplate: Zinc electroplate malleable iron or cast-iron alloy boxes as produced by Appleton Electric Co., Crouse-Hinds Co., or O-Z/Gedney Co., with zinc electroplate steel covers to suit application.
    - b. Hot Dipped Galvanized: Hot dipped galvanized malleable iron or cast-iron alloy boxes as produced by Crouse-Hinds Co., or O-Z/Gedney Co., with stainless steel cover screws, and hot dipped malleable iron covers gasketed or ungasketed to suit application.

2. Junction And Pull Boxes:

- a. Cast Iron/Zinc Electroplate: Zinc electroplate cast iron boxes as produced by Appleton Electric Co., Crouse-Hinds Co., or O-Z/Gedney Co., with zinc electroplate steel or cast-iron cover.
  - b. Cast Iron/Hot Dipped Galvanized: Hot dipped galvanized cast iron boxes as produced by Crouse-Hinds Co., or O-Z/Gedney Co., with stainless steel cover screws and hot dipped cast iron cover gasketed or ungasketed to suit application.
  - c. Provide gasketed cover by box manufacturer. Provide threaded hubs.
  - d. All units located outdoors at grade shall be flush mounted, 12" square by 12" deep, and set in concrete measuring 24" square by 24" deep.
- D. Specific Purpose Outlet Boxes: As fabricated by manufacturers for mounting their equipment.
- E. Finishing Collar or Combination Finishing Collar/Outlet Box (Surface Mounted Equipment Used With Exposed Raceway):
1. Finishing Collar: Same finish and peripheral dimensions as the equipment base, including provisions for mounting, slots to fit over raceway and of depth to cover outlet box and extend back to ceiling or wall.
  2. Combination Finishing Collar/Outlet Box: Same finish and peripheral dimensions as the equipment base, gauge or thickness of metal as required by National Electrical Code, including provisions for mounting, and knockouts or threaded bosses for entrance of raceway.

2.3 CABINETS

- A. All cabinets shall comply with UL50, "Electrical Cabinets and Boxes".

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before proceeding with the installation of junction boxes and pull boxes, check the locations with the Architect and have same approved.

3.2 INSTALLATION

- A. Install electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
- B. Mounting Position of Wall Outlets for Wiring Devices: Unless otherwise indicated, install boxes so that the long axis of each wiring device will be vertical.

- C. Align adjacent wall-mounted outlet boxes for switches, thermostats, and similar devices with each other.
- D. Use flush mounting outlet boxes in finished areas.
- E. Do not install flush mounting boxes back-to-back in walls; provide minimum 6-inch separation. Provide minimum 24" separation in acoustic rated walls.
- F. Outlet boxes for receptacles and communications outlets located on same wall as finned tube radiation shall be mounted horizontally below fin. Not all of these locations are identified on the drawings; cooperate with the Division 23 to determine areas affected.
- G. Height of Wall Outlets: Unless otherwise indicated, locate outlet boxes with the centerline of the device at the following elevations above finished floor:

Wall Mounted Luminaires	--6'-6",	unless otherwise noted.
Exit Lights	--8'-0",	where ceiling height allows a minimum of 6-inch clearance between ceilings and top of exit light, otherwise mount exit light so that its top is 6 inches below finished ceiling. Adjust height and clearances as required to suit installation over doors.
Switches	--4'-0",	unless otherwise noted.
Single and Duplex Receptacles	--1'-6",	unless otherwise noted or located on same wall as finned tube radiation. If so, mount horizontally below fin.
Communications Outlets	--1'-6",	unless otherwise noted or location on same wall as finned tube radiation
Telephone Outlets	--1'-6",	unless otherwise noted or location on same wall as finned tube radiation.
Telephone Outlets (Wall Mounted Phones)	--4'-0".	
Computer Outlets	--1'-6",	unless otherwise noted or location on same wall as finned tube radiation.
Fiber Optics Outlets	--1'-6",	unless otherwise noted or location on same wall as finned tube radiation.
Sound System Handsets	--4'-0".	
Call In Switches	--4'-0".	
Television Outlets	--1'-6",	unless otherwise noted or location on same wall as finned tube radiation.
Clocks	--7'-6",	unless otherwise noted.
Manual Fire Alarm Stations	--4'-0"	

Alarm Indicating Appliances (Bells, horns, or chimes)	--not less than 7'- 6",	to top of appliance, where the ceiling height allows a minimum of 6 inches clearance between ceiling and top of appliance, whichever is lower. Refer to NFPA 72.
Strobes	--6'-8",	to bottom of strobe lens and no greater than 8'- 0" above finished floor to top of strobe lens. Refer to NFPA 72.
Area of Refuge Call-in Station	--4'-0".	
Area of Refuge Master Station	--4'-0".	
Area of Refuge Illuminated Sign	--6'-8",	where ceiling height allows a minimum of 6-inch clearance between ceiling and top of exit light, otherwise mount exit light so that its top is 6 inches below finished ceiling. Adjust height and clearances as required to suit installation over doors.
Emergency Power-Off Pushbutton	--4'-0".	
Boiler Shutdown Switch	--4'-0".	
*Exception: All electrical wiring devices located in central supply or medical gas (cylinder) storage rooms shall be located at or above 5'- 0" above finished floor to avoid physical damage per the requirements of NFPA 99.		

- H. Use gang box where more than one device is mounted together. Do not use sectional box.
- I. Use gang box with plaster ring for single device outlets.
- J. Supplementary Junction and Pull Boxes: In addition to junction and pull boxes indicated on the Drawings and required by the NEC, provide supplementary junction and pull boxes as follows:
  - 1. When required to facilitate installation of wiring.
  - 2. At every third 90 degree turn in conjunction with raceway sizes over 1 inch.
  - 3. At intervals not exceeding 100 feet in conjunction with raceway sizes over 1 inch.
  - 4. To preserve fire resistance rating of partitions and other elements, using materials and methods under the provisions of Division 1 Specification Sections.

### 3.3 OUTLET, JUNCTION, AND PULL BOX SCHEDULE

- A. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- B. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- C. Boxes For Concealed Conduit System:
  - 1. Depth: To suit job conditions and also comply with Article 314 of the National Electrical Code.
  - 2. For luminaires and ceiling mounted boxes:
    - a. Use 4-inch octagon or square galvanized steel outlet boxes.
    - b. Use adjustable steel channel fasteners for hung ceiling outlet box.
    - c. Do not fasten boxes to ceiling support wires.
    - d. Support boxes independently of conduit, except cast box that is connected to two rigid steel conduits both supported within 12" of box.
  - 3. For Junction and Pull Boxes: Use galvanized steel boxes with flush covers.
  - 4. For Switches, Receptacles, etc.:
    - a. Plaster or Cast-In-Place Concrete Walls: Use 4" or 4-11/16" galvanized steel boxes with device covers.
    - b. Walls Other Than Plaster or Cast-In-Place Concrete: Use type of galvanized steel box which will allow wall plate to cover the opening made for the installation of the box.
    - c. Minimum size of outlet boxes for ground fault interrupter (GFI) receptacles shall be 4 inches square x 2-1/8 inches deep, with device covers for the wall material and thickness involved.
    - d. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
    - e. Use stamped steel bridges to fasten flush mounting outlet box between studs.
    - f. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
  - 5. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
  - 6. Cooperate with others for the mounting heights and locations of outlets mounted above counters, benches and backsplashes.
  - 7. Outlet boxes for receptacles and various communications outlets located on same wall as finned tube radiation shall be mounted horizontally below fin. Cooperate with Division 23 to determine areas affected; not all locations are identified on the drawings.
  - 8. Boxes in noncombustible walls or ceilings shall be so installed that the front edge will not set back more than 1/4 inch from the finished surface; in combustible walls or ceilings, boxes shall be flush. Provide all extension rings, device covers, etc. as required to accomplish this per NEC Article 314.20.

9. Repair all plaster, drywall or plasterboard around edges of box to be in compliance with NEC Article 314.21.

D. Boxes For Exposed Conduit System:

1. General:
  - a. Use zinc electroplate or hot dipped galvanized steel malleable iron or cast-iron alloy outlet, junction, and pull boxes in conjunction with ferrous raceways in dry and damp locations unless otherwise specified or indicated on the Drawings.
  - b. Use hot dipped galvanized malleable iron or cast-iron alloy outlet boxes in conjunction with ferrous raceways in wet locations unless otherwise specified or indicated on the Drawings.
  - c. Use hot dipped galvanized cast iron junction and pull boxes in conjunction with ferrous raceways in wet locations unless otherwise specified or indicated on the Drawings.
2. Conduit Sizes  $\frac{1}{2}$ ",  $\frac{3}{4}$ " and 1": Use threaded type boxes.
3. Conduit Sizes Over 1" (Wet Locations): Use threaded type boxes.
4. Conduit Sizes Over 1" (Dry Locations and Damp Locations): Use galvanized steel boxes.
5. Finishing Collar or Combination Finishing Collar/Outlet Box (Surface Mounted Equipment Used With Exposed Raceway):
  - a. Use finishing collar where surface mounted equipment is installed on an exposed raceway outlet box and the equipment base is larger than the outlet box.
  - b. Use combination finishing collar/outlet box where surface mounted equipment is not indicated to be installed on an exposed raceway outlet box, but raceway cannot be run directly into equipment body due to equipment design.

E. Specific Purpose Outlet Boxes:

1. Use to mount equipment when available and suitable for job conditions.
2. Unless otherwise specified, use threaded type boxes for exposed conduit system, steel (painted) for surface metal raceway system and galvanized steel for recessed installations.
3. Fire alarm system outlet boxes located in unfinished areas, whether exposed or concealed, shall be painted red.

F. Large Pull Boxes: Boxes larger than 100 cubic inches in volume or 12" in any dimension.

1. Interior Dry Locations: Use hinged metal cabinets and enclosures.
2. Other Locations: Use surface mounted cast metal box.

G. Outdoor Grade Mounted Junction and Pullboxes: Set cast boxes in concrete bases flush with finished grade.

### 3.4 INSTALLATION OF CABINETS AND HINGED DOOR ENCLOSURES

- A. Mount with fronts straight and plumb.
- B. Set cabinets in finished spaces flush with walls.

### 3.5 ADJUSTING

- A. Adjust flush mounting outlets to make front flush with finished wall material.
- B. Install knockout closure in unused box opening.

### 3.6 GROUNDING

- A. Electrically ground all outlet boxes, junction boxes, pull boxes, metallic cabinets, and enclosures. Where wiring to item includes a grounding conductor, provide a grounding terminal in the interior of the cabinet, box or enclosure.

### 3.7 CLEANING AND FINISH REPAIR

- A. Upon completion of installation, inspect components. Remove burrs, dirt, and construction debris and repair damaged finish including chips, scratches, abrasions and weld marks.
- B. Galvanized Finish: Repair damage using a zinc-rich paint recommended by the manufacturer.
- C. Painted Finish: Repair damage using matching corrosion inhibiting touch-up coating.

END OF SECTION 262716

## SECTION 262726 – WIRING DEVICES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. The following Division 26 Sections must be coordinated and included in the project.
  - 1. Section 260923, AUTOMATIC CONTROLS.

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Wall Switches.
  - 2. Lighting Control Wall Stations for LED Luminaires:
  - 3. Receptacles.
  - 4. Special Purpose Receptacles.
  - 5. Wall Plates.
  - 6. Fire-Rated Poke-Through with Service Fitting.
- B. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.3 REFERENCES

- A. Standards referenced in the text of this Section are listed below according to source, designation, and publication title. Revision of standards occur periodically and may happen before this Section is updated in the future. Where sources of publications are identified below by name only, including acronym or abbreviation, refer to Division 1 Section "Definitions and Standards."
  - 1. Underwriters Laboratories Inc. (UL):
    - UL 20 General-Use Snap Switches.
    - UL 486A Wire Connectors and Soldering Lugs for Use with Copper Conductors.
    - UL 498 Electrical Attachment Plugs and Receptacles.
    - UL 943 Ground-Fault Circuit Interrupters.



2. National Electrical Manufacturers Association (NEMA):
  - Std Pub/No. PR 2 Enclosures for Plugs, Receptacles and Connectors of the Pin and Sleeve Type.
  - Std Pub/No. PR 3 Guide to Pin and Sleeve Plugs, Receptacles, and Connectors.
  - Std Pub/No. WD 1 General-Purpose Wiring Devices.
  - Std Pub/No. WD 6 Wiring Device Configurations.
3. Americans with Disabilities Act Accessibility Guidelines for Building and Facilities (ADAAG).

#### 1.4 SUBMITTALS

- A. Provide product data for each type device specified, with manufacturer's catalog information showing dimensions, colors, and configurations. Provide in bound brochure.
- B. Submit sample of engraved wallplates with panelboard and circuit number identified.
- C. Include samples of each product if different from manufacturer or catalog number specified.

#### 1.5 QUALITY ASSURANCE

- A. Regulating Requirements: Comply with provisions of NFPA 70 "National Electrical Code." Provide wiring devices which are listed and labeled by UL and comply with applicable UL and NEMA standards.

#### 1.6 SEQUENCE AND SCHEDULING

- A. Schedule installation of wall plates after the surface upon which they are installed has received final finish.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following:
  1. Hubbell Incorporated (Design Make).
  2. Pass & Seymour/Legrand.
  3. Eaton/Arrow Hart and Eaton/Crouse-Hinds.
  4. Appleton Electric.
  5. Automatic Switch Co.

## 2.2 WIRING DEVICES

- A. General: Provide wiring devices, in types, characteristics, grades, colors, and electrical ratings for applications indicated which are UL listed and which comply with NEMA WD 1 and other applicable UL and NEMA standards.
  - 1. Provide ivory color devices except as specifically indicated. Adjust manufacturer's catalog designations accordingly.
  - 2. Use red colored receptacles for emergency powered circuits.
- B. Wall Switches:
  - 1. General: Provide industrial, extra heavy-duty specification grade device with copper alloy contact arm, heavy duty bumper pads for quiet, smooth operation, high strength thermoplastic polycarbonate toggle, and silver alloy contacts.
  - 2. Local Switches, Single Pole: Ivory toggle, 20 ampere, 120/277 VAC; Hubbell's HBL1221 series, Pass & Seymour's PS20AC1 series or Eaton/Arrow Hart's AH1221 series.
  - 3. Local Switches, Three-Way: Ivory toggle, 20 ampere, 120/277 VAC; Hubbell's HBL1223 series, Pass & Seymour's PS20AC3 series or Eaton/Arrow Hart's AH1223 series.
  - 4. Local Switches, Four-Way: Ivory toggle, 20 ampere, 120/277 VAC; Hubbell's HBL1224 series, Pass & Seymour's PS20AC4 series or Eaton/Arrow Hart's AH1224 series.
  - 5. Lighted Toggle Switches: Clear polycarbonate toggle lighted in OFF position, 20 ampere, 120 VAC, single pole or three-way; Hubbell's HBL1221IL series, Pass & Seymour's PS20AC1CSL series, or Eaton/Arrow Hart's AH1221LT series.
  - 6. Pilot Light Switches: Clear polycarbonate toggle lighted in ON position, 20 ampere, 120 VAC, single pole or three way: Hubbell's HBL1221PLC series, Pass & Seymour's PS20AC1CPL series, or Eaton/Arrow Hart's AH1221PL series.
- C. Lighting Control Wall Stations for LED Luminaires:
  - 1. Refer to Section 26 09 23 AUTOMATIC CONTROLS for details on lighting controls.
- D. Receptacles:
  - 1. General: Provide extra heavy-duty, specification grade devices with nylon face, back and side wired, .036" thick brass, triple-wipe power contacts
  - 2. Specification Grade Duplex Receptacles: Ivory color, duplex receptacle, NEMA 5-20R (20 ampere, 125 VAC, 2P, 3W); Hubbell's HBL 5352 series, Pass & Seymour's 5362A series, or Eaton/Arrow Hart's AH5362 series.
  - 3. Ground Fault Interrupter Receptacles, Self-Testing with Trip Indicator light, UL 943 Compliant, Type "GFI": Ivory color, duplex receptacle rated 20 ampere (NEMA 5-20R), circuit-ampacity 20 ampere; Hubbell's GF20 series, Pass & Seymour's 2097 series, or Eaton/Arrow Hart's SGF20 series.

4. Special purpose receptacles.

- a. Specification Grade Split-Wire Controlled Receptacle, Type "C": Ivory color, duplex receptacle, NEMA 5-20R (20 ampere, 125 VAC, 2P, 3W), permanently and clearly marked with split circuit one controlled face, in compliance with ASHRAE Std. 90.1, NEMA and NEC; Hubbell's BR20C1 series, Pass & Seymour's 5362CH series, Eaton Arrow Hart's 5362CH series, Leviton's 5362-S1 series.
- b. TVSS Surge Suppression, Type "SP": NEMA 5-20R (20 ampere, 125 VAC, 3P, 3W), Ivory color, duplex receptacle, surge suppression type with audible alarm and LED indicator, metal oxide varistor to dissipate the electrical energy of voltage spikes, minimum 240 joules/15000A per mode, complying with UL 1449 and all ANSI/IEEE 62.41 and CSA standards; Hubbell's HBL5362 series, Pass & Seymour 5362ISP series, Eaton/Arrow Hart's 5362VS series.
- c. Combination USB Charger/Tamper Resistant Duplex Receptacle, Type "USB": 20 ampere, 125 VAC, 2P, 3W, duplex receptacle with two USB charging ports rated minimum 2.1A, 5 VDC, 2100 ma, with LED indicator light, tamper resistant shutters, ivory color; Hubbell USB20X2I series, Pass and Seymour TR5362USB series, Eaton/Arrow-Hart TR7756V series.
- d. As produced by Hubbell, Pass & Seymour or Eaton/Arrow Hart. NEMA configuration and ratings to suit requirements.

2.3 WALL PLATES

- A. General: Single and combination, of types, sizes, and with ganging and cutouts as indicated. Provide plates which mate and match with wiring devices to which attached. Provide metal screws for securing plates to devices with screw heads colored to match finish of plates. Provide wall plates with engraved legend where indicated.
- B. Stainless steel wall plates: Type 302 stainless steel with satin, smooth finish; Eaton/Arrow Hart's 93071 Series, Hubbell's S Series, or Pass & Seymour's Sierra Series. Provide a single, multi-gang plate for multiple devices at one location.
- C. All receptacle wall plates shall be engraved to identify serving panelboard and circuit number; tape-fastened, lamacoid or dymo labels will not be permissible. Letters shall be 3/16" high, red for emergency and black for normal power. Hubbell's 8241 series, Pass & Seymour's TP series, or Eaton/Arrow Hart's PJ series.
- D. Provide a single, multi-gang plate for multiple devices at one location; no exceptions. If non-standard construction, provide custom order plates as required.
- E. Weatherproof Covers: NEMA 3R gasketed gray UV-stabilized polycarbonate hinged device cover, 5" wide x 4-1/4" high x 3-1/2" deep; Intermatic WP1010H series with insert for use with GFI type receptacle, Eaton/Arrow Hart's WIU-1HX series or accepted equal.
- F. For surface mounted devices in Mechanical Rooms, Electric Rooms, Boiler Rooms, etc., provide utility covers, unless device is flush mounted.

## 2.4 FIRE RATED POKE-THROUGH WITH SERVICE FITTING

- A. Provide poke-through assembly, UL listed to maintain the floor fire rating as required by Article 300-21 of the National Electrical Code. Unit shall be classified for fire resistance in 1, 1½ and 2 hour rated floors.
- B. Provide unit with stationary top fire barrier which expands during fire conditions to provide an upper fire seal, and adjustable bottom fire barrier which accommodates floor thicknesses from 2¼" to 7", and which seals bottom of core-drilled hole.
- C. Provide unit with integral junction box to incorporate two (2) 3/4" and one (1) 1/2" knockouts for power or one (1) 1-3/8" diameter opening for telephone data.
- D. Provide unit to accommodate power and/or data/telephone as shown on Drawings. Prewire power raceway using #12 AWG wire.
- E. Service fitting shall be flush profile with dual service capability consisting of 20 ampere duplex power and two (2) data slot ports, UL listed and classified. Finish to be selected at time of submittals.
- F. Make: Walker RCI series poke-thru with RC900 series flush service fitting, Hubbell S1PT3IM series poke-thru with flush service fitting.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Install wiring devices and accessories as indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC and in accordance with recognized industry practices to fulfill project requirements.
- B. Cooperate with other Work, including painting, electrical boxes and wiring installations, as necessary to interface installation of wiring devices with other Work.
- C. Install wiring devices only in electrical boxes that are clean; free from building materials, dirt and debris.
- D. Install galvanized steel wall plates in unfinished spaces.
- E. Install wiring devices after wiring Work is completed.
- F. Install wall plates after painting Work is completed.

- G. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for wiring devices. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standard 486A. Use properly scaled torque indicating hand tool.
- H. Install a ground fault interrupter (GFI) receptacle at every location shown on the Drawings, feed thru wiring, (series feeding downstream standard receptacles from a GFI receptacle) is not permitted.
- I. All rooms larger than 500 square feet shall have one or more accessible lighting controls so that general lighting may be reduced by at least one-half throughout the room.
- J. Rooms not intended for 24-hour continuous use shall be provided with automatic controls capable of limiting the hours of lighting use to the occupancy of the room. Refer to Section 26 09 23, Automatic Lighting Controls.

### 3.2 EXAMINATION

- A. Verify outlet boxes are installed at specified heights.
- B. Verify wall openings are neatly cut and will be completely covered by wall plates.
- C. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

### 3.3 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean debris from outlet boxes.

### 3.4 PROTECTION

- A. Protect installed components from damage. Replace damaged items prior to date of substantial completion.

### 3.5 INSTALLATION

- A. Install Products in accordance with manufacturer's instructions.
- B. Install wiring devices in outlet boxes.
- C. Install devices plumb and level.

D. Local Switches:

1. Install local switches rated 20 amperes, 120/277 VAC for switches unless otherwise shown on the drawings or specified.
2. Where more than one switch occurs at the same location and are connected to same voltage, arrange switches in gangs and cover with one-piece faceplate.
3. Install single pole switches so that switch handle is up when switch is in the "On" position.
4. Locate switch on strike side of doorways.
5. Mount switches with centerline of box at 48" above floor as a basic condition, unless noted otherwise.
6. The location of any switch may be changed a distance not to exceed six (6) feet from drawing location, before Work is actually in, at no additional cost to the Owner.
7. Use lighted toggle switches in mechanical rooms and crawlspaces.
8. Use pilot light switches where indicated on drawings.

E. Receptacles:

1. Install Specification Grade receptacles, NEMA 5-20R, 20 amperes, 125V, 2P, 3W, for duplex receptacles and single receptacles throughout, unless otherwise shown on the Drawings or specified.
2. Install receptacles with ground pole on top.
3. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.
4. In those areas where vertical space is not available, such as under fin radiation, cabinets, and above back splash, mount horizontally with ground slot to the left.
5. Mount receptacles as indicated in Section 26 27 16, unless noted otherwise.
6. Provide ground fault interrupter receptacles where shown on the Drawings and required by NEC.
7. All special receptacles shall be grounding types, installed with separate green ground wire.
8. Provide dust tight receptacles with weatherproof type hinged covers in wood shop. Wire through power off system.

F. Wall Plates:

1. Install wall plates on all wiring devices in dry locations, with finish as specified.
2. Install blank wall plates on outlet boxes that are for future equipment.
3. Coverplates for telephone and communications outlets shall match device plates in each area.
4. Install special wall plates as needed for telephone and computer outlets, to match finish of other device plates.
5. Provide stainless steel wallplates for all normal power devices. For devices on emergency circuits, provide hospital grade nylon faceplates, red color.
6. Provide panelboard and circuit breaker number identification for all receptacles and switches on the project. Use full panelboard designation; no abbreviations or prefix designations will be permissible. Submit identified wallplate sample for approval, whether croy tape or engraved wallplate is specified in Article 2.03. Dymo type labels are not permissible.

7. Where flush plates are required over outlet boxes that cannot be set deep enough for the plates to fit closely over the finished wall surfaces, provide oak mats to fill the space between the finished wall surface and the plate.

G. Floor Boxes:

1. Use cast floor boxes for all installations in slab on grade; formed steel boxes are acceptable for other installations.
2. Set floor boxes level.
3. Install in concrete floor slabs so they are completely enveloped in concrete except for the top.
4. Provide conduit under slab to floor boxes located in slab-on-grade areas of the ground floor.
5. Provide each compartment of each floor box with grounding terminal consisting of a washer-in-head machine screw, not smaller than No. 10-32, screwed into a tapped hole in the box.
6. Adjust covers of floor boxes flush with finished floor.  
Provide weatherproof sealed conduit stub-up in kitchen and other wet mop applications.
7. Locate as directed by Architect. Cooperate with installation of furniture and its final layout.

3.6 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.

3.7 FIELD QUALITY CONTROL

- A. Inspect each wiring device for defects.
- B. Operate each wall switch with circuit energized and verify proper operation.
- C. Verify that each receptacle device is energized.
- D. Testing: Prior to energizing circuits, test wiring for electrical continuity, and for short-circuits. Ensure proper polarity of connections is maintained. Subsequent to energizing, test wiring devices and demonstrate compliance with requirements, operating each operable device at least six times. Use a Hubbell #5200 outlet testing unit.
- E. Test ground fault interrupter operation with both local and remote fault simulations in accordance with manufacturer recommendations. Unit shall trip in the range of 4-6 milliamperes as prescribed by Underwriters' Laboratories, Inc., use a Hubbell #GFT-2G GFI testing unit.
- F. Replace all devices that fail testing.

- G. Submit test report for review, listing testing procedure, equipment and model number used and deficiencies corrected for each test procedure.

END OF SECTION 262726



## SECTION 262816 – SAFETY SWITCHES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes general construction criteria required for Safety Switches (under 600 Volts) and Elevator Power Modules. The extent, location and details are indicated on the Drawings and in schedules.
- B. Provide all safety switches with trims, back boxes, fusing and grounding as required. Cooperate with the other divisions of Work, such as HVAC and Plumbing.

#### 1.2 REFERENCES

- A. National Fire Protection Association (NFPA):  
No. 70                National Electrical Code
- B. Underwriters Laboratories, Inc. (UL):  
UL 198C            High Intensity Capacity Fuses; Current Limiting Types.  
UL 198E            Class R Fuses
- C. National Electrical Manufacturers Association (NEMA):  
NEMA, KS 1 Enclosed Switches
- D. Federal Specifications:  
FS W-S-865        Switch, Box, (Enclosed), Surface Mounted.  
FS W-S-870        Fuseholders (For Plug and Enclosed Cartridge Fuses).

#### 1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions on each safety switch.
- B. Shop Drawings: Include the following for each:
  - 1. Cabinet size.
  - 2. Voltage and Current Rating.
  - 3. Safety switch short circuit rating.
  - 4. Accessories.

- C. Maintenance Data: Submit maintenance data and parts list for each safety switch and accessory; including "trouble-shooting" maintenance guide. Include that data, product data, and shop drawings in a maintenance manual.

#### 1.4 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of equipment of sizes, types and rating required, whose products have been in satisfactory use in similar service for not less than 10 years.
- B. Installer's Qualifications: Firms with at least five completed installations of similar scope.
- C. Codes and Standards: As indicated in Article 1.2.
- D. Minor Changes: Minor changes and modifications of ampere rating, lug sizes, fuse sizes, etc., within the confines of standard catalog ratings, if required by the Engineer before or during the submittal review, shall be provided by Division 26 without any change in Contract sum.
- E. Unless otherwise noted, all equipment covered under this Section of the Specifications shall be of the same make.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver equipment in factory-fabricated containers or wrappings, which properly protect equipment from damage.
- B. Store equipment in original packaging. Store inside well ventilated area protected from weather, moisture, soiling, extreme temperatures, humidity; laid flat and blocked off ground.
- C. Handle equipment carefully to prevent damage, breaking, and scoring of finishes. Do not install damaged units or components; replace with new.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide safety switch products of one of the following:
  - 1. Siemens Energy & Automation, Inc.
  - 2. General Electric Company
  - 3. Eaton Corporation Cutler-Hammer
  - 4. Square D Schneider Electric

## 2.2 SAFETY SWITCH, SINGLE THROW

### A. NEMA 1, 3R, 4 (Stainless Steel), 12:

1. Quick-make, quick-break mechanism.
2. Fused unless otherwise indicated on the Drawings.
3. Fused switches equipped with fuseholders to accept UL Class RK-1 or RK-5 fuses.
4. Use NEMA 1 enclosure for indoor use, NEMA 3R for damp areas and outdoors, NEMA 4 for spray areas, sump pits, crawl spaces, etc., unless otherwise indicated on the Drawings.
5. 240 Volt rating for 120, 208 or 240 Volt applications.
6. Provide insulated, solid neutral bar when neutral conductor is required in the circuit.
7. Provide copper ground lugs.
8. Current rating, number of poles as indicated on the Drawings.
9. Heavy Duty
10. Lockable in the "OFF" position.
11. Provide interlock kit with 1 N.O./1 N.C. contact which operates from the switch mechanism.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and conditions under which safety switches are to be installed and supported. Notify in writing of conditions detrimental to proper completion of the Work. Do not proceed with Work until unsatisfactory conditions have been corrected in manner acceptable to the Owner.

### 3.2 INSTALLATION

- A. Provide safety switch for every motor requiring same, per NEC 430-12. Apply switches in each code required location to meet NEC and as called for.
- B. Provide all miscellaneous bolts, nuts, washers, etc. made of rust resistant material.
- C. Mount safety switches and elevator power modules at a maximum of 6'-6" to the centerline of the operating handle of the device.
- D. Touch-up all scratches.
- E. Where there is more than one driving machine in a machine room, disconnect switches or circuit breakers shall be numbered to correspond to the number of the driving machine that they control.

- F. Provide engraved identification nameplate for all equipment with designation of equipment served, what panel fed from, size of conductors, voltage, etc
1. For NEMA 1 enclosures, rivet or bolt nameplate to the cover.
  2. For NEMA 12 enclosures, rivet or bolt and gasket nameplate to the cover.
  3. For NEMA 3R, 4 and 4X enclosures, attach nameplate to the cover using adhesive specifically designed for the purpose, or mount nameplate on wall or other conspicuous location adjacent to switch. Do not penetrate enclosure with fasteners.
- G. Install fuses in fusible type safety switches.

END OF SECTION 262816

## SECTION 262817 – CIRCUIT BREAKERS FOR EXISTING PANELBOARD

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes criteria required for providing circuit breakers in panelboards. The extent, location and detail of each panelboard is as indicated on the Drawings as specified herein.
- B. Types of existing panelboards in this Section include the following:
  - 1. 120/208 Volt, Three Phase, Four Wire Distribution Panelboards.
  - 2. 277/480 Volt, Three Phase, Four Wire Distribution Panelboards.
  - 3. 120/208 Volt, Three Phase, Four Wire Lighting and Appliance Panelboards.
- C. Provide all labor, materials and equipment necessary to perform the Work required for the complete installation and operation of circuit breaker installation.

#### 1.2 REFERENCES

- A. Electrical Code Compliance: Comply with applicable local code requirements of the authority having jurisdiction and the applicable articles of NEC.
- B. NEMA Compliance:
  - 1. AB 1 Molded Case Circuit Breakers.
  - 2. PB 1 Panelboards.
  - 3. PB 1.1 Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
- C. UL Compliance: All panelboards shall be UL-listed and labeled. Comply with all applicable UL standards.
  - 1. UL 67 Electrical Panelboards.
  - 2. UL 486 A Wire Connectors & Soldering Lugs for Use with Copper Conductors
- D. Federal Specifications:
  - 1. FS W-C-375 Circuit Breakers, Molded Case, Branch Circuit and Service

### 1.3 SYSTEM DESCRIPTION

- A. Provide all bus hardware, circuit breakers, filler plates and modifications to existing panelboards as required for work shown on the Drawings and specified herein.
- B. Rearrange existing circuit breakers to accommodate the additional circuit breakers as required.
- C. The breakers AIC rating shall match the AIC rating of the existing panelboard.

### 1.4 SUBMITTALS

- A. Not required.

### 1.5 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Provide only circuit breakers and panelboard accessories manufactured by panelboard manufacturers indicated on drawings of sizes, types and rating shown.
- B. Installer's Qualifications: Firms with at least five successfully completed projects of similar scope.
- C. Codes and Standards: As indicated in Article 1.2.
- D. Minor Changes: Minor changes and modifications of ampere rating, lug sizes, fuse sizes, etc., within the confines of standard catalog ratings, if required by the Engineer before or during the submittal review, shall be provided by Division 16-E [26] without any change in Contract sum.
- E. Used or remanufactured circuit breakers will not be acceptable.

### 1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver circuit breakers in factory-fabricated containers or wrappings, which properly protect equipment from damage.
- B. Store equipment in original packaging. Store inside well ventilated area protected from weather, moisture, soiling, extreme temperatures and humidity.
- C. Handle equipment carefully to prevent damage. Do not install damaged units or components; replace with new.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Field verify panelboard manufacturers prior to procuring circuit breakers indicated on Drawings.

### 2.2 CIRCUIT BREAKERS

- A. General:

- 1. Provide bolted bus connections unless indicated otherwise on drawings.
  - 2. Multi-pole breakers with common internal trips.
  - 3. Breakers shall be quick-make and quick-break toggle mechanism.
  - 4. 75 degrees Centigrade terminal rating.
  - 5. Provide integral thermal magnetic, molded case breakers with non-adjustable, long time, thermal overload, instantaneous electromagnetic trip unit.
  - 6. Provide circuit breaker handle lock-on devices, as called for.
  - 7. Provide filler plates for unused panelboard front openings.

- B. Circuit Breakers:

- 1. Manufactured by the same company of the panelboard its being installed.
  - 2. Similar to existing circuit breakers.
  - 3. Compatible with existing panelboard.
  - 4. Number of poles and ampere trip rating as indicated on Drawings.
  - 5. Complete with bus mounting hardware and accessories required for installation.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine panelboards and conditions under which circuit breakers are to be installed. Notify in writing of conditions detrimental to proper completion of the Work.
- B. Notify in writing prior to commencing Work of any circuit breaker or accessory which is no longer commercially available.

### 3.2 INSTALLATION OF CIRCUIT BREAKERS IN EXISTING PANELBOARDS

- A. Install new circuit breakers in existing panelboards where indicated, balanced equally across phases to prevent overloading any phase in the panelboard.
- B. Provide all miscellaneous bolts, nuts, washers, etc. made of rust resistant material.

- C. Provide filler plates for unused spaces in panelboards.
- D. Provide new typewritten directory indicating equipment controlled by each circuit breaker. Indicate room numbers, function, etc. to positively identify each branch circuit. Identify date directory was updated.

### 3.3 FIELD QUALITY CONTROL

- A. Prior to energization of electrical circuitry, check all accessible connections to manufacturer's tightening torque specifications.
- B. Prior to energization, check for electrical continuity of circuits, and for short-circuits.
- C. After new and existing circuits are energized, take current reading on panelboard feeder during a heavy usage time period. If phases are substantially unbalanced, rearrange both new and existing circuits in panelboard to equally distribute load between all phases.

### 3.4 ADJUSTING AND CLEANING

- A. Adjust operating mechanisms for full mechanical movement.
- B. Touch-up scratched or marred surfaces to match original finishes.

END OF SECTION 262817



## SECTION 265113 – LIGHTING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes general construction criteria required for luminaires, exit lights and associated lamps and ballasts. The extent, location and details of luminaires are indicated on the Drawings and in schedules.
- B. Types of luminaires in this Section include the following.
  - 1. Light Emitting Diode (LED)

#### 1.2 REFERENCES

- A. Electrical Code Compliance: Comply with applicable local code requirements of the authority having jurisdiction and NEC Articles 220, 410, and 510 as applicable to installation, and construction of building luminaires.
- B. Energy Conservation Construction Code of New York State.
- C. National Fire Protection Association (NFPA):
  - No. 70 National Electrical Code
  - No. 101 Life Safety Code
- D. NEMA Compliance: Comply with applicable requirements of NEMA Stds Pub/No.'s LE 1 and LE 2 pertaining to lighting equipment.
- E. IES Compliance: Comply with IES pertaining to general lighting practices.
- F. UL Compliance: Comply with UL standards, pertaining to luminaires. Provide luminaires and components that are UL-listed and labeled.
- G. American National Standards Institute (ANSI).

#### 1.3 SYSTEM DESCRIPTION

- A. Provide all luminaires, drivers and accessory equipment as shown on the Drawings and specified herein.

#### 1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions on each type of lamp, building luminaires and related components.
- B. Listed manufacturers and their series and/or model numbers do not imply unconditional specification approval. The series and/or model numbers listed may not be current, but are included as an acceptable series of products that must still comply with the written description and specification. Custom modifications may be required to make the series and/or model numbers listed comply with these written descriptions and specifications.
- C. Shop Drawings: Submit luminaire shop drawings in booklet form with a separate sheet for each luminaire assembled in alphabetical or numerical order, with proposed luminaire and accessories clearly indicated on each sheet. Include a typed index, listing luminaire type designations, luminaire manufacturer, complete catalog number and ballast type. At bottom of page, indicate complete listing of lamps that are to be used; include manufacturer name and complete catalog numbers. Any submittal drawings larger than 11x17 shall be made with a minimum of two(2) full size copies delivered to the Engineer's office.
- D. Point-by-Point Footcandle Calculations: Submit point-by-point footcandle calculations of outdoor site lighting as part of submittal package, for approval.
- E. Samples: Submit one workable sample of each product if different from manufacturer specified herein, to aid in analyzing the submittal. Finish samples, factory drawings, special test data, etc, may also be requested by the Engineer.
- F. Maintenance Data: Submit maintenance data and parts list for each luminaire and accessory; including "trouble-shooting" maintenance guide. Include that data, product data, and shop drawings in a maintenance manual.

#### 1.5 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of luminaires of sizes, types and rating required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer's Qualifications: Firms with at least five successfully completed projects of similar scope.
- C. Codes and Standards: As indicated in Article 1.2.

#### 1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver luminaires in factory- fabricated containers or wrappings, which properly protect luminaires from damage.

- B. Store luminaires in original packaging. Store inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, humidity, laid flat and blocked off ground.
- C. Handle luminaires carefully to prevent damage, breaking, and scoring of finishes. Do not install damaged units or components; replace with new.

#### 1.7 WARRANTY

- A. Provide one-year all parts and labor, on-site warranty.
- B. Five-year or longer warranties on luminaires, drivers, etc. shall be provided in writing by the respective manufacturer prior to closeout. Submit with O&M documentation.

#### 1.8 SEQUENCING AND SCHEDULING

- A. Properly interface installation of luminaires with other Work.
- B. Protect lighting installation to minimize possibility of damage and soiling during remainder of construction.

#### 1.9 SPARE MATERIALS

- A. Provide two of each plastic type lens.
- B. Provide one (1) LED array boards for each type of LED luminaire installed.
- C. Provide two (2) of each LED driver type. Replacement drivers shall fit into the existing mountings.
- D. Provide one of each type of tamperproof screwdriver for equipment furnished with tamperproof hardware.
- E. Obtain signed receipts from Owner for extra materials.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Available manufacturers are subject to compliance with the requirements set forth herein.

- B. Listed manufacturers and their series and/or model numbers do not imply unconditional specification approval. The series and/or model numbers listed, are included as acceptable series of products that must still comply with the written description and specification. Custom modifications may be required to make the series and/or model numbers listed comply with these written descriptions and specifications.

## 2.2 INTERIOR LUMINAIRE TYPES

A. Exit Lights (LED Type):

1. Type: Diffuse LED, red letters stencil face, one-piece injection molded white thermoplastic type with universal mounting, universal directional arrows.
2. Construction: One-piece, injection molded white thermoplastic housing, maximum 10½" high x 12" wide x 2½" with universal (end, top or back) mounting bracket/ballast housing; hinged faceplate with spring latches and overlapping light seal; 6" high x ¾" stroke letters with red impact resistant fiberglass color panel, and white housing finish. Provide with tamperproof TORX-head screws. Faceplate shall have two concealed, universal, directional arrow knockouts. No exposed mounting hardware; prismatic polycarbonate downlight diffuser. All metal end and base parts shall have matte white finish. Maximum overall height of ceiling mounted units with battery pack shall be no greater than 10 1/2".
3. Lamps: Normal lamps shall be LED type, dual rated 120/277 VAC, in conformance with UL 924, NFPA 101 Life Safety, NEC and OSHA requirements.
4. Schedule:

<u>Type</u>	<u>Mounting</u>	<u>Face</u>
X1	Wall Back Surface	Single
X2	Ceiling	Single
X3	Ceiling	Double

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and conditions under which luminaires are to be installed, and substrate for supporting luminaires. Notify in writing of conditions detrimental to proper completion of the Work.
- B. Examine each luminaire to determine suitability for lamps specified.

### 3.2 REMOVAL OF LAMPS

- A. Contractor shall carefully remove and handle to prevent breakage, all HID and fluorescent lamps containing mercury in excess of the levels defined by federal and New York State DEC regulations. Contractor shall place all removed HID and fluorescent lamps into special disposal boxes to protect against breakage, furnished by Owner. Owner will be responsible for disposal.

### 3.3 INSTALLATION OF LUMINAIRES

- A. Install luminaires at locations and heights as indicated, in accordance with luminaire manufacturer's written instructions, applicable requirements of NEC, NECA'S "Standard of Installation", NEMA standards, and with recognized industry practices to ensure that luminaires fulfill requirements.
- B. Provide luminaires and/or luminaire outlet boxes with hangers to properly support luminaire weight. Submit design of hangers, method of fastening, other than indicated or specified herein for review.
- C. Ceiling Surface and Suspended Luminaires: Fasten luminaires securely to structural supports. Luminaires that cover less than 225 sq. in. and are less than 25" long shall be supported from stud in outlet box that is rigidly supported from building structure. Larger surface mounted luminaires shall be independently supported from building structure using 1/4" threaded steel rods as follows:
  - 1. Surface mounted, up to 24" W x 6' L: two supports.
  - 2. Surface mounted, up to 24" W x 12' L: three supports.
  - 3. Surface mounted, 30" sq. thru 60" sq.: four supports.
  - 4. Suspended, up to 18" W x 12' L: two supports.
  - 5. Suspended, 18" sq. thru 24" sq.: two supports.
  - 6. Suspended, 30" sq. thru 9' sq.: four supports.

If conditions are not clean during installation, wrap luminaire with protective plastic.

- D. Wall mounted luminaires that weigh less than 5 lbs may be supported from fixture stud in outlet box that shall be rigidly supported by steel bars that span 2 studs. Provide additional screws or toggle bolts at ends of luminaires if necessary to prevent any movement or turning. Exterior luminaires that extend out less than 12" and weigh less than 30 lbs shall have two supports (toggle or expansion bolts, impact screws, or other accepted method) in addition to outlet box support.

- E. Ceiling recessed luminaires that weigh less than 50 lbs. shall be supported from ceiling support channels plus each luminaire shall have two safety chains that are secured to building structure. Chain shall be bow-tie type made of No. 12 AWG steel wire with cadmium finish, Yorkville No. 2750 or accepted equal. In grid type ceilings each luminaire shall also be fastened to ceiling framing members at four (4) locations using method acceptable to NEC Article 410. Luminaires that weigh more than 50 lbs. shall be independently supported from building structure using four 1/4" steel rods. For plaster ceilings, provide plaster frame; install in cooperation with ceiling contractor. Provide proper mounting equipment and trim for recessed luminaires to adapt them to the ceiling or wall construction and to prevent light leaks around trim.
- F. Cooperate with all other trades and refer to Architect's reflected ceiling plan and obtain acceptance before proceeding with ceiling work. Verify ceiling construction and report in writing any discrepancies between the ceiling type and the luminaire type before releasing luminaires for manufacture.
- G. In mechanical and electrical equipment rooms, cooperate with other trades for all luminaires, supports, and outlet box locations with completed ductwork, piping, etc. Unless otherwise indicated, suspend luminaires below or between ducts with bottom of luminaires at 9'- 0" above floor; layout shown on Drawings is approximate only.
- H. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Stds 486A and B, and The National Electrical Code.
- I. Locations of luminaires shall be evenly proportioned in room unless otherwise indicated.
- J. Mount surface luminaires tight to surface without distorting it. Secure to prohibit movement.
- K. Support stems and/or cables for suspended luminaire shall be carefully aligned and each shall hang true all directions.
- L. Install recessed luminaires to permit removal from below.
- M. Install clips to secure recessed grid-supported luminaires in place.
- N. Equip all recessed downlights with support rails and t-bar clips to secure bar hangers in suspended grid ceiling systems.
- O. Install all luminaires in same room or adjacent rooms without doors between such that lamps inside the luminaires are all oriented in the same direction. This applies to situations where both 2' x 4' and 2' x 2' luminaires are installed in the same room.
- P. All exit lights shall be rigidly secured to structure with 1/4" threaded steel rod so as to prevent rotating sign. Verify direction of all arrows. Exit lights shall not be mounted in positions where they are blocked from view by ducts, pipes, furred beams, luminaires, etc.

- Q. Use clean, white cotton gloves when handling parabolic and paracube wedge louvers, anodized reflectors, glass lenses, or other parts subject to fingerprints.
- R. Immediately prior to substantial completion, replace lamps in luminaires that are observed to be broken, damaged or noticeably dimmed after Contractor's use and testing and at no additional expense to the Owner.
- S. Furnish stock or replacement lenses, drivers and LED boards as stated in Article 1.9. Deliver replacement stock as directed to Owner's storage space.

### 3.4 FIELD QUALITY CONTROL

- A. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

### 3.5 ADJUSTING AND CLEANING

- A. Clean luminaires of dirt and construction debris upon completion of installation. Clean fingerprints and smudges from lenses and photometric control surfaces.
- B. Protect installed luminaires from damage during remainder of construction period.
- C. Aim and adjust luminaires as directed.
- D. Relamp luminaires that have failed lamps. Replace fuses that may have failed.

### 3.6 WIRING

- A. Do not use luminaire as a raceway except as allowed in NEC article 410-31. Wiring to luminaire shall be 90 degrees C wire minimum.
- B. Switching control groups shall be exactly as indicated on Drawings. In areas that have multi-level control, switch positions shall be carefully maintained.
- C. Provide equipment grounding connections for luminaires as indicated. Tighten connections to comply with tightening torques specified in UL Std 486A to assure permanent and effective grounds.

### 3.7 SCHEDULE

- A. Refer luminaire schedule on Drawing 9-E-900 for basis of design.

END OF SECTION 265113

## SECTION 270000 – COMMUNICATIONS

### PART 1 – GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 00 and 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Project Overview:

- 1. Provide labor, materials, equipment and services to perform operations required for the complete installation Local Area Network (LAN) and related work as required in the Contract Documents.

- B. Intent:

- 1. The contractor shall provide all materials, qualified labor and services required to ensure a complete and operational system, installed in accordance with the intent of the Contract Documents.
  - 2. The contractor shall furnish and install all incidental items not actually shown or specified, but which are required by best practices to provide complete functional systems.

- C. Section Includes:

- 1. This section includes general requirements for each section in Division 27 and shall be used in conjunction with specifications, other related Divisions and related Contract Documents to establish the total requirements for the project.
  - 2. Refer to other sections within Division 27 for additional requirements.

#### 1.3 REFERENCES

- A. Definitions:

- 1. Structured Cabling Systems (SCS) wiring is defined as all required equipment and cabling including hardware, termination blocks, cross connect wire or cordage, patch panels, patch cords, telecommunication outlets, work area cords, UTP, F-UTP and fiber cable installed and configured to provide computer data and voice connectivity.
  - 2. BICSI: Building Industry Consulting Service International.
  - 3. RCDD: Registered Communications Distribution Designer.



4. Contractor: The successful bidder engaged to provide the work of this specification
5. Owner's Telecommunications Representative: Brian Przepasniak, Network Engineer, 716-645-5084, [brianprz@buffalo.edu](mailto:brianprz@buffalo.edu)
6. Consolidation Point: A location for interconnection between horizontal cables extending from building pathways and horizontal cables extending into furniture pathways.
7. Telecommunications Space: A generic term to refer to all areas containing telecommunications equipment, including entrance facilities (EFs), equipment Rooms (ERs), telecommunications rooms (TRs), cable vaults, and areas of data centers containing telecommunications equipment and isolated racks or cabinets in rooms not dedicated to telecommunications.
8. Telecommunications Room (TR): A telecommunications space that differs from equipment rooms (ERs) and entrance facilities (EFs) in that this space is generally considered a floor-serving space that provides a connection point between backbone and horizontal cabling.
9. Entrance Facility (EF): An entrance to a building for both public and private network service cables; including wireless, mechanical and electrical services, and the entrance point at the building wall; and continuing to the entrance room or space.
10. Equipment Room (ER): An environmentally controlled centralized space for telecommunications equipment that usually houses a main or intermediate cross connect.
11. Entrance Point (EP): The point of emergence for telecommunications cabling through an exterior wall, a floor, or from a conduit.
12. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
13. Patch Cords: a length of wire or fiber cable with connectors on one or both ends used to connect two passive cross-connect terminations.
14. Equipment Cord: A cable assembly used to connect active electronics to horizontal cabling or backbone.
15. Passive Equipment: Equipment that does not require electric power.
16. Active Equipment: Energized equipment used for receiving or transmitting analog or digital signals.
17. Permanent Link: Horizontal cabling link encompassing all components of the horizontal cabling (TO, patch panels, blocks, jumpers and patch cords that join them in the horizontal cross-connect). It is distinguished from a channel because it does not include the equipment cables/cords at the telecom spaces or work area.
18. Channel: The end-to-end transmission path between two points at which application specific equipment is connected; encompasses all the elements of the horizontal cabling link, plus the equipment cords in the telecommunications spaces and work area.
19. EMI: Electromagnetic interference.
20. IDC: Insulation displacement connector.
21. LAN: Local area network.

22. MUTOA: Multiuser telecommunications outlet assembly, a grouping in one location of several telecommunications outlet/connectors.
23. Telecommunication Outlet (TO): Connecting device mounted in a work area used to terminate horizontal cable and interconnect cabling with station equipment.
24. Telecommunications Outlet/Connector: A connecting device in the work area on which horizontal cable or outlet cable terminates.
25. UTP: Unshielded twisted pair.
26. Jack: receptacle used in conjunction with a plug to make electrical contact between communications circuits, e.g., eight-position/eight-contact modular jacks.
27. Ladder Cable Tray: A fabricated structure consisting of two longitudinal side rails connected by individual transverse members (rungs).
28. Raceway: an enclosed channel designed expressly for holding wires or cables; may be of metal or insulating material. The term includes conduit, tubing, wire ways, under floor raceways, overhead raceways and surface raceways; does not include cable tray.
29. Cable Tray: vertical or horizontal open supports, usually made of aluminum or steel, which are fastened to the building structure. Cables are laid in and fastened to the trays.
30. Trough or Ventilated Cable Tray: A fabricated structure consisting of integral or separate longitudinal rails and a bottom having openings sufficient for the passage of air and using 75 percent or less of the plan area of the surface to support cables.
31. Protectors: electrical protection devices used to limit foreign voltages on metallic communications circuits.
32. Bonding: permanent joining of metallic parts to form an electrically conductive path which will assure electrical continuity and the capacity to conduct safely any current likely to be imposed on it.
33. NRTL: A Nationally Recognized Testing Laboratory (NRTL) is a private-sector organization that OSHA has recognized as meeting the legal requirements in 29 CFR 1910.7 to perform testing and certification of products using consensus-based test standards.

B. Reference Standards:

1. Specific reference in specifications to codes, rules, regulations, standards, manufacturer's instructions, or requirements of regulatory agencies shall mean reference to the latest printed edition of each in effect at the date of contract.
2. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.
3. The publications listed below form a part of this specification. The publications are referred to in the text by basic designation only.
4. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within the following references.
  - a. ANSI/TIA-568.0-D, "Generic Telecommunications Cabling for Customer Premises".

- b. ANSI/TIA-568.1 D, "Commercial Building Telecommunications Infrastructure Standard".
- c. ANSI/TIA-568-C.2, "Balanced Twisted-Pair Telecommunication Cabling and Components Standard".
  - 1) ANSI/TIA-568-C.3, "Optical Fiber Cabling Components Standard".
  - 2) ANSI/TIA-568-C.4, "Broadband Coaxial Cabling and Components Standard".
  - 3) ANSI/TIA-569-D, "Telecommunications Pathways and Spaces".
  - 4) ANSI/TIA-606-B, "Administration Standard Telecommunications Infrastructure".
  - 5) ANSI/TIA-607-C, "Generic Telecommunications Bonding and Grounding (Earthing) and Bonding for Customer Premises".
  - 6) ANSI/TIA-758-B, "Customer-Owned Outside Plant Telecommunications Infrastructure Standard".
  - 7) ANSI/BICSI 005-2016, Electronic Safety and Security (ESS) System Design and Implementation Best Practices
  - 8) BICSI, Information Technology Systems Installation Methods Manual, 6th Edition
  - 9) BICSI, Telecommunications Distribution Methods Manual, 13th Edition
  - 10) BICSI, Outside Plant Design Reference Manual, 5th Edition
  - 11) Underwriters Laboratories (UL) Cable Certification and Follow-Up Program
  - 12) National Electrical Manufacturers Association (NEMA)
  - 13) American Society for Testing Materials (ASTM)
  - 14) National Electrical Code (NEC) with applicable edition year
  - 15) National Electrical Safety Code (NESC) with applicable edition year
  - 16) Institute of Electrical and Electronic Engineers (IEEE)
  - 17) UL Testing Bulletin

#### 1.4 ADMINISTRATIVE REQUIREMENTS

- A. General: Refer to other sections within Division 27 for specific requirements.
- B. Coordination:
  - 1. Coordinate the location of all components with other trades in order to maintain required separation distances.
  - 2. Coordinate the location of all components within any telecommunications space with the owner's telecommunications representative.
- C. Pre-installation Meetings: The contractor and contractor's RCDD must meet with the owner's telecommunications representative prior to installing any components. The intent of this meeting is to clarify requirements, coordination and schedule before any work is performed.

D. Sequencing:

1. All painting and dust-creating work shall be completed within a telecommunications space prior to installing any telecommunications components.
2. Telecommunications spaces shall be clean and free of trash and dust, prior to installing equipment racks, cables, or any other components.
3. Before powering up any active components, the telecommunications space must have working and adequate environmental controls.

E. Scheduling: Any potential service effecting work shall be done after hours, as coordinated by the Owner's Telecommunications Representative.

F. The Contractor's RCDD shall review, approve and stamp all documents prior to submitting.

G. The Contractor's RCDD shall warrant in writing that 100% of the installation meets the requirements and standards specified herein upon completion of all work.

## 1.5 ACTION AND INFORMATIONAL SUBMITTALS

A. General:

1. Refer to other sections within Division 27 for additional requirements.

B. Product Data:

1. Manufacturer data sheet, cut sheets, listing and installation instructions for all products, components and accessories being used, to be submitted with bid.
2. Clearly identify any resubmitted drawing sheets, documents or cut sheets either by using a color to highlight or cloud around resubmitted information.

C. Shop and Coordination Drawings:

1. Shall include those required in other Division 27 sections, including, but not limited to the following:
  - a. Telecommunications grounding and bonding system details.
  - b. Communications pathway system details.
  - c. Telecommunications outlets, faceplates, jacks, etc., and labeling, drawn on the floorplan.
2. Shall incorporate all changes made to the building identified in, but not limited to, addendum, change notices, site instructions or deviations resulting from site conditions.
3. Maintain drawing numbering or page/sheet scheme consistency as per previously issued drawings/documents.

4. Graphic symbols and component identification on detail drawing shall conform to the latest ANSI/TIA 568, ANSI/TIA 569, ANSI/TIA 606 and ANSI/NECA/BICSI 607 conventions.
5. Submit one electronic and one hard copy with project deliverables within three weeks subsequent to substantial completion.
6. Hard copy of floor plans for record shall be plotted to a standard, saleable, identified drawing scale.

D. Delegated Design Submittals:

1. Detailed drawings of all design decisions to be made by the contractor.

E. Test and Evaluation Reports:

1. Results of field tests that are recommended or required by the applicable standards or specified within the Division 27 Sections.

F. Manufacturer Reports:

1. All testing and inspection reports provided by the manufacturers for all products.

G. Qualification Statements:

1. The appropriate documentation from the certifying manufacturer showing the project is registered and qualified for the advanced system warranty.

1.6 CLOSEOUT SUBMITTALS

A. General:

1. Refer to other sections within Division 27 for additional requirements.

B. Operation and Maintenance Data:

1. Communications Design drawings are to be supplied to the Architect to prepare the master Record Drawings.
2. Record Drawings shall be in AutoCAD format, same version as used by Architect and consultant. Dimensions and scale of the drawing sheets submitted shall match the size of the drawing used for the contract documents, and shall include the cable numbers labeled in accordance with this document.
3. Utilize normal recognized drafting procedures that match AutoCAD standards, Architect and consultant guidelines and methodology.

C. Warranty Documentation:

1. Provide a numbered certificate, from the manufacturer, registering the installation for the advanced system warranty.
2. Point of contact for warranty claims.



- D. Letter of project completion from Contractor's RCDD.

#### 1.7 MAINTENANCE SUBMITTALS

- A. General:

- 1. Refer to other sections within Division 27 for additional requirements.

#### 1.8 QUALITY ASSURANCE

- A. General:

- 1. Refer to other sections within Division 27 for additional requirements.

- B. Installers:

- 1. Copper and fiber cable installation shall be by the owner.

#### 1.9 DELIVERY STORAGE AND HANDLING

- A. General:

- 1. Refer to other sections within Division 27 for additional requirements.

- B. Delivery and Acceptance Requirements:

- 1. Visually inspect all products for damage.
  - 2. Do not accept any visibly damaged products.

- C. Storage and Handling Requirements:

- 1. Store products in a clean and dry environment.
  - 2. Store products in an environment and manner that they will not be damaged.

- D. Packaging Waste Management:

- 1. Dispose of or recycle all waste produced.

#### 1.10 SITE CONDITIONS

- A. General:

- 1. Refer to other sections within Division 27 for additional requirements.

## 1.11 WARRANTY

### A. General:

1. Refer to other sections within Division 27 for additional requirements.

### B. Extended Correction Period:

1. Contractor shall provide a minimum one (1) year warranty on installation and workmanship PLUS an Extended Product Warranty and Advanced System Warranty for this system and shall commit to make available local support for the product and system during the Warranty period.

## PART 2 – PRODUCTS

### 2.1 GENERAL

- A. All products and components of any specific system must be from the same manufacturer, or otherwise as approved by the manufacture providing the Warranty and Application Assurance, or the Owner's Telecommunications Representative.
- B. Refer to other sections within Division 27 for additional requirements.

## PART 3 – EXECUTION

### 3.1 INSTALLERS

- A. Refer to other sections within Division 27 for additional requirements.

### 3.2 EXAMINATIONS

- A. Verify all existing conditions and report any discrepancies to the architect and owner's telecommunications representative.
- B. Verify dimensions in areas of installation by field measurements before fabrication and indicate measurements on shop drawings.
- C. Visually inspect all cables, cable reels, and shipping cartons to detect possible cable damage incurred during shipping and transport. Visibly damaged goods are not acceptable and shall be replaced by the contractor at no additional cost to the Owner.
- D. Refer to other sections within Division 27 for additional requirements.

### 3.3 PREPARATIONS

- A. Protect any existing components and systems, in the area of performing work, from dust, water, or overheating.
- B. Provide all necessary services (power, temporary cooling, etc.) to maintain existing active components that are within the scope of and will remain in service during this project.
- C. Remove all existing components and systems, as indicated in the demolition, completely. For example, do not cut ends off of cables, rather completely remove entire cable.
- D. Refer to other sections within Division 27 for additional requirements.

### 3.4 INSTALLATION

- A. General:
  - 1. Contractor shall install work following specifications, drawings, manufacturer's instructions, approved submittal data and the referenced standards.
  - 2. Refer to other sections within Division 27 for additional requirements.

### 3.5 REPAIR/RESTORATION/REINSTALLATION

- A. Refer to other sections within Division 27 for additional requirements.

### 3.6 FIELD OR SITE QUALITY CONTROL

- A. Manufactured products, materials, equipment, and components shall be provided, conditioned, applied, installed, connected, and tested in accordance with the manufacturer's specifications and printed instructions.
- B. The installation of all system components shall be carried out under the direction of qualified personnel as defined in this section.
- C. Appearance shall be considered as important as mechanical and electrical efficiency.
- D. Workmanship shall meet or exceed industry standards.

### 3.7 SYSTEM STARTUP

- A. Refer to other sections within Division 27 for additional requirements.



3.8 ADJUSTING

- A. Refer to other sections within Division 27 for additional requirements.

3.9 CLEANING

- A. Keep work areas will be in a broom-swept condition throughout the duration of the installation process.
- B. Remove all unnecessary tools and equipment, unused materials, packing materials, and debris from each area where work has been completed unless designated for storage.
- C. Damp clean all surfaces prior to final acceptance by Owner.
- D. Refer to other sections within Division 27 for additional requirements.

3.10 CLOSEOUT ACTIVITIES

- A. Refer to other sections within Division 27 for additional requirements.

3.11 PROTECTION

- A. Refer to other sections within Division 27 for additional requirements.

3.12 MAINTENANCE

- A. Refer to other sections within Division 27 for additional requirements.

3.13 ATTACHMENTS

- A. Refer to other sections within Division 27 for additional requirements.

END OF SECTION 270000



## SECTION 270500 - COMMON WORK RESULTS FOR COMMUNICATIONS

### PART 1 – GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 01 Specification Sections, and 270000 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. General:

- 1. Refer to Section 270000 for General Requirements.

- B. Intent:

- 1. The drawings show only general locations of equipment, devices, raceways, cable trays, boxes, etc., unless specifically dimensioned.
  - 2. The contractor shall be responsible for the proper placement and routing of equipment, cable, raceways, cable runway, and related components, according to the Contract Documents and subject to prior review by the architect and owner's telecommunications representative.
  - 3. The contractor shall refer any conflicts within the Contract Documents to the architect and owner's telecommunications representative.

- C. Section Includes:

- 1. Pathways
  - 2. Hangers and supports
  - 3. Conduits
  - 4. Backboxes
  - 5. Surface raceways

#### 1.3 REFERENCES

- A. Definitions:

- 1. Refer to Section 270000 for General Requirements.

- B. Reference Standards:

- 1. ASTM E 814, "Fire Tests of Through Penetration Firestops".
  - 2. ANSI/UL1479, "Fire Tests of Through Penetration Firestops".

3. ASTM E90, "Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements".
4. Underwriters Laboratories Inc. (UL) – Fire Resistance Directory
5. National Fire Protection Association (NFPA) – NFPA 101: Life Safety Code.
6. National Fire Protection Association (NFPA) – NFPA 70: National Electrical Code.

#### 1.4 ADMINISTRATIVE REQUIREMENTS

##### A. General:

1. Refer to Section 270000 for general requirements.

#### 1.5 ACTION AND INFORMATIONAL SUBMITTALS

##### A. General:

1. Refer to Section 270000 for additional requirements.

##### B. Product Data: For each type of product.

##### C. Shop Drawings:

1. For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.
2. System labeling schedules for grounding and telecommunications conduits.

##### D. Samples:

1. For wire ways, nonmetallic wire ways, and surface pathways, and for each color and texture specified, 12 inches (300 mm) long.

##### E. Coordination Drawings:

1. Pathway routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
  - a. Structural members in paths of pathway groups with common supports.
  - b. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

#### 1.6 CLOSEOUT SUBMITTALS

##### A. General:

1. Refer to Section 270000 for general requirements.

## 1.7 MAINTENANCE SUBMITTALS

### A. General:

1. Refer to Section 270000 for General Requirements.

## 1.8 QUALITY ASSURANCE

### A. General:

1. Refer to Section 270000 for General Requirements.

## 1.9 SITE CONDITIONS

### A. General:

1. Refer to Section 270000 for General Requirements.

## PART 2 – PRODUCTS

### 2.1 GENERAL

#### A. Refer to Section 270000 for General Requirements.

#### B. All products shall:

1. Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
2. Comply with TIA-569-D.

### 2.2 FIRESTOP SYSTEMS

#### A. The fire-rated pathway shall contain a built-in fire sealing system sufficient to maintain the hourly fire rating of the barrier being penetrated. The self-contained sealing system shall automatically adjust to the installed cable loading and shall permit cables to be installed, removed, or retrofitted without the need to remove or reinstall firestop materials. The pathway shall be UL Classified and/or FM Systems Approved and tested to the requirements of ASTM E814 (UL1479).

#### B. Must use available manufacturers accessories to install multiple units together, in close proximity.

#### C. Re-penetrable Fire-Stop Systems:

1. Specified Technologies Inc. (STI) EZ-PATH® Series 44+ Fire-Rated Pathway
2. Specified Technologies Inc. (STI) Series 44+ Extension module (EZD44ES)

3. Hilti Speed Sleeve (CP 653) with integrated smoke seal fabric membrane
4. Hilti Speed Sleeve (CP 653) with integrated smoke seal fabric membrane

## 2.3 METAL CONDUITS AND FITTINGS

- A. Description: Metal raceway of circular cross section with manufacturer-fabricated fittings.
- B. GRC: Comply with ANSI C80.1 and UL 6.
- C. ARC: Comply with ANSI C80.5 and UL 6A.
- D. IMC: Comply with ANSI C80.6 and UL 1242.
- E. PVC-Coated Steel Conduit: PVC-coated
  1. Comply with NEMA RN 1.
  2. Coating Thickness: 0.040 inch (1 mm), minimum.
- F. EMT: Comply with ANSI C80.3 and UL 797.
- G. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
  1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.
  2. Expansion Fittings: PVC or steel to match conduit type, complying with UL-467, rated for environmental conditions where installed, and including flexible external bonding jumper.
  3. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.
- H. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

## 2.4 MULTI-OUTLET ASSEMBLES

- A. Refer to Specification Section 260534.

## 2.5 SURFACE METAL PATHWAYS

- A. Description: Galvanized steel with snap-on covers, complying with UL 5.
- B. Finish: Manufacturer's standard enamel finish in color selected by Architect.

## 2.6 HOOKS

- A. Description: Prefabricated sheet metal cable supports for telecommunications cable.
- B. Galvanized or stainless steel.
- C. J shape.

## 2.7 BOXES, ENCLOSURES, AND CABINETS

- A. Description: Enclosures for communications.
- B. General Requirements for Boxes, Enclosures, and Cabinets:
  - 1. Box extensions used to accommodate new building finishes shall be of same material and manufacturer as the recessed box.
  - 2. Device Box Dimensions: 5 inches by 5 inches by 2-7/8 inches deep
  - 3. Gangable boxes are prohibited.
- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, Type FD, with gasketed cover.
- E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- F. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.
- G. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1, with continuous-hinge cover with flush latch unless otherwise indicated.
  - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
- H. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- I. Cabinets:
  - 1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
  - 2. Hinged door in front cover with flush latch and concealed hinge.
  - 3. Key latch to match panel boards.
  - 4. Metal barriers to separate wiring of different systems and voltage.
  - 5. Accessory feet where required for freestanding equipment.
  - 6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

## PART 3 – EXECUTION

### 3.1 GENERAL

- A. Refer to Section 270000 for General Requirements.

### 3.2 PATHWAY APPLICATION

- A. Indoors: Apply pathway products as specified below unless otherwise indicated:
1. Exposed, Not Subject to Physical Damage: EMT.
  2. Exposed, Not Subject to Severe Physical Damage: EMT.
  3. Exposed and Subject to Severe Physical Damage: IMC. Pathway locations include the following:
    - a. Loading dock.
    - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
    - c. Mechanical rooms.
    - d. Gymnasiums
  4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
  5. Damp or Wet Locations: IMC.
  6. Pathways for Optical-Fiber or Communications Cable in Spaces Used for Environmental Air: EMT.
  7. Pathways for Optical-Fiber or Communications-Cable Risers in Vertical Shafts: EMT.
  8. Pathways for Concealed General-Purpose Distribution of Optical-Fiber or Communications Cable: EMT.
  9. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel units in institutional and commercial kitchens and damp or wet locations.
- B. Minimum Pathway Size: 1 inch (25 mm) for copper and aluminum cables, and 1 inch (25 mm) for optical-fiber cables.
- C. Pathway Fittings: Compatible with pathways and suitable for use and location.
1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
  2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
  3. EMT: Use set-screw or compression, steel fittings. Comply with NEMA FB 2.10.
- D. Install surface pathways only where indicated on Drawings or where prior approved by Architect/Engineer.



### 3.3 INSTALLATION

- A. Comply with the following standards for installation requirements except where requirements on Drawings or in this Section are stricter:
  - 1. NECA 1.
  - 2. NECA/BICSI 568.
  - 3. TIA-569-D.
  - 4. NECA 101
  - 5. NECA 102.
  - 6. NECA 105.
  - 7. NECA 111.
- B. Comply with NFPA 70 limitations for types of pathways allowed in specific occupancies and number of floors.
- C. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.
- D. Comply with requirements in Section 260529 "Supporting Devices" for hangers and supports.
- E. Keep pathways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal pathway runs above water and steam piping.
- F. Complete pathway installation before starting conductor installation.
- G. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- H. Install no more than the equivalent of two 90-degree bends in any pathway run. Support within 12 inches (300 mm) of changes in direction. Utilize long radius ells for all optical-fiber cables.
- I. Conceal rigid conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- J. Support conduit within 12 inches (300 mm) of enclosures to which attached.
- K. Stub-ups to Above Recessed Ceilings:
  - 1. Use EMT, IMC, or RMC for pathways.
  - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
  - 3. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of pathway and fittings before making up joints. Follow compound manufacturer's written instructions.
  - 4. Coat field-cut threads on PVC-coated pathway with a corrosion-preventing conductive compound prior to assembly.

5. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install insulated bushings on conduits terminated with locknuts.
6. Install pathways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus one additional quarter-turn.
7. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure, to assure a continuous ground path.
8. Cut conduit perpendicular to the length. For conduits of 2-inch (50-mm) trade size and larger, use roll cutter or a guide to ensure cut is straight and perpendicular to the length.
9. Install pull wires in empty pathways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Secure pull wire, so it cannot fall into conduit. Cap pathways designated as spare alongside pathways in use.

L. Surface Pathways:

1. Install surface pathway for surface telecommunications outlet boxes only where indicated on Drawings.
2. Install surface pathway with a minimum 2-inch (50-mm) radius control at bend points.
3. Secure surface pathway with screws or other anchor-type devices at intervals not exceeding 48 inches (1200 mm) and with no less than two supports per straight pathway section. Support surface pathway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

M. Pathways for Communications Cable: Install pathways, metal and nonmetallic, rigid and flexible, as follows:

1. 3/4-Inch (21-mm) Trade Size and Smaller: Install pathways in maximum lengths of 50 feet (15 m).
2. 1-Inch (25-mm) Trade Size and Larger: Install pathways in maximum lengths of 75 feet (23 m).
3. Install with a maximum of two 90-degree bends or equivalent for each length of pathway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.

N. Install pathway-sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed pathways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install pathway-sealing fittings according to NFPA 70.

O. Install devices to seal pathway interiors at accessible locations. Locate seals, so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all pathways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.

2. Where an underground service pathway enters a building or structure.
  3. Where otherwise required by NFPA 70.
- P. Comply with manufacturer's written instructions for solvent welding PVC conduit and fittings.
- Q. Expansion-Joint Fittings:
1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F (17 deg C), and that has straight-run length that exceeds 25 feet (7.6 m). Install in each run of aboveground RMC and EMT that is located where environmental temperature change may exceed 100 deg F (55 deg C), and that has straight-run length that exceeds 100 feet (30 m).
  2. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C) of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F (0.0115 mm per meter of length of straight run per deg C) of temperature change for metal conduits.
  3. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
  4. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
- R. Hooks:
1. Size to allow a minimum of 50 percent future capacity without exceeding design capacity limits.
  2. Shall be supported by dedicated support wires. Do not use ceiling grid support wire or support rods.
  3. Hook spacing shall allow no more than 6 inches (150 mm) of slack. The lowest point of the cables shall be no less than 6 inches (150 mm) adjacent to ceilings, mechanical ductwork and fittings, luminaires, power conduits, power and telecommunications outlets, and other electrical and communications equipment.
  4. Space hooks no more than 5 feet (1.5 m) o.c.
  5. Provide a hook at each change in direction.
- S. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
- T. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surface to provide a flat surface for a rain tight connection between box and cover plate or supported equipment and box.
- U. Horizontally separate boxes mounted on opposite sides of walls, so they are not in the same vertical channel.

- V. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- W. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

### 3.4 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR COMMUNICATIONS PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

### 3.5 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 260510 "Firestopping".
- B. Install systems in accordance with Performance Criteria and in accordance with the conditions of testing and classification as specified in the published design.
- C. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of products.
- D. Install re-penetrable firestop systems for all penetrations requiring firestopping in the following areas:
  - 1. All penetrations into and out of a telecommunications room, equipment room or entrance facility.
  - 2. At any point along the path of a cable or ladder-type tray that require firestopping.
  - 3. In between floors, as sleeves, used to connect two telecommunication spaces.
- E. Before beginning installation, verify that substrate conditions previously installed under other sections are acceptable for installation of firestopping in accordance with manufacturer's installation instructions and technical information.
- F. Surfaces shall be free of dirt, grease, oil, scale, laitance, rust, release agents, water repellants, and any other substances that may inhibit optimum adhesion.
- G. Provide masking and temporary covering to protect adjacent surfaces.
- H. Do not proceed until unsatisfactory conditions have been corrected.

### 3.6 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage or deterioration.
- B. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

- C. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

### 3.7 FIELD OR SITE QUALITY CONTROL

- A. Keep areas of work accessible until inspection by authorities having jurisdiction.
- B. Where deficiencies are found, repair firestopping products so they comply with requirements.

### 3.8 CLEANING

- A. Clean up and remove all dust, dirt, debris created by the work.

### 3.9 CLOSEOUT ACTIVITIES

- A. Firestopping
  - 1. Place system stickers on each side of wall penetrations.
  - 2. Place a reproduction (photo copy) of the UL System description in a document protector and mount to the wall next to the wall penetration
  - 3. Highlight the section of the system description that list the allowed cable types.

END OF SECTION 270500

## SECTION 271100 – COMMUNICATIONS EQUIPMENT ROOM FITTINGS

### PART 1 – GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 01 Specification Sections, and 270000 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. System Specific Overview

- 1. This section includes the minimum requirements for the equipment and cable installations in communications equipment rooms (Telecommunications Closets).

- B. Section Includes:

- 1. This section includes basic telecommunications room and equipment room requirements and fittings including:
    - a. Equipment cabinets, racks, frames and enclosures.
    - b. Vertical and horizontal cable management.
    - c. Ladder rack.
    - d. Adjustable Cable Runway.
    - e. Telecommunications service entrance pathways.
    - f. Rack Mount Power Distribution Units.
    - g. Wall linings for telecommunication spaces.

#### 1.3 REFERENCES

- A. Reference Standards

- 1. Refer to Section 270000
  - 2. NFPA 70 – National Electric Code, 2008
  - 3. NEMA – VE 1 – Metal Cable Tray Systems, 2009
  - 4. NEMA – VE 2 – Metal Cable Tray Installation Guidelines, 2006

#### 1.4 ADMINISTRATIVE REQUIREMENTS

##### A. General

1. Refer to Section 270000 for additional requirements.

#### 1.5 ACTION AND INFORMATIONAL SUBMITTALS

##### A. General

1. Refer to Section 270000 for additional requirements.

##### B. Shop Drawings

1. Rack elevation drawing for each equipment rack, and each telecommunications room, with all components to be installed within and onto the equipment rack, under this contract.

#### 1.6 CLOSEOUT SUBMITTALS

##### A. General

1. Refer to Section 270000 for additional requirements.

#### 1.7 MAINTENANCE SUBMITTALS

##### A. General

1. Refer to Section 270000 for additional requirements.

##### B. Extra Stock Material

1. Rack mount screws not used for installing patch panels and other hardware shall be bagged and left with the rack upon completion of the installation.

#### 1.8 QUALITY ASSURANCE

##### A. General

1. Refer to Section 270000 for additional requirements.

B. Mock-ups

1. Assemble and connect together, equipment racks with vertical management, horizontal management and patch panels in each telecommunication room prior to securing and drilling holes in floor, in order to determine exact placement by the owner's telecommunications representative.

1.9 SITE CONDITIONS

A. General

1. Refer to Section 270000 for additional requirements.

PART 2 – PRODUCTS

2.1 General

- A. Refer to Section 270000 for additional requirements.

2.2 WALL LININGS

A. Wall Linings

1. 4 feet by 8 feet by  $\frac{3}{4}$  inch A-C grade plywood, kiln dried to a maximum moisture content of 15%.
2. Fire-retardant paint, light grey in color.

2.3 RACK MOUNT POWER DISTRIBUTION UNITS (PDU'S)

- A. 3.3/3.8kW Single-Phase 208/240V Basic PDU, 14 Outlets (12 C13 & 2 C19), NEMA L6-20P Input, 15 ft. Cord, 1U Rack-Mount
1. Tripp Lite Product Number: PDUH20HVL6
  2. Or other equivalent in order to match power receptacle specifications in the equipment racks, and as approved by the owner's telecommunications representative.



## 2.4 EQUIPMENT RACKS

### A. Free Standing Relay Racks (3" Deep Standard Rack)

1. Racks shall be manufactured from aluminum extrusion.
2. Each rack will have two L-shaped top angles, two L-shaped base angles and two C-shaped equipment-mounting channels. The rack will assemble with nut and bolt hardware. The base angles will be pre-punched for attachment to the floor.
3. Equipment mounting channels shall be 3" deep and punched on the front and rear flange with the EIA-310-D Universal hole pattern, 1-3/4" (44.45 mm) rack-mount spaces (U), to provide 45U for equipment. Each mounting space (U) shall be marked and numbered on the mounting channel.
4. When assembled with top and bottom angles, equipment-mounting channels will be spaced to allow attachment of 19" EIA or 23" wide or 35" wide rack-mount equipment. Equipment attachment points shall be threaded with 12-24 roll-formed threads. The rack shall include assembly and equipment-mounting hardware. Racks shall include 50 each combination pan head, pilot point, mounting screws.
5. The assembled rack shall measure 7' (84" high; 20.3" wide, 24.3" wide or 36.3" wide. The sides (webs) of the equipment-mounting channels will be punched to allow attachment of vertical cable managers along the sides of the rack or for rack-to-rack baying.
6. Assembly hardware shall electrically bond the top angles, side channels and base angles together when assembled, and there shall be a masked ground attachment point with 1/4-20 threaded studs spaced 5/8" apart on the inside of the side channel to attach a ground lug allowing easy attachment to the Ground.
7. The rack will be rated for 1,000 lb. (453.6 kg) of equipment.
8. The rack shall be UL and cUL Listed as a Communications Circuit Accessory, DUXR and DUXR7 category, file number 140851.
9. Finish shall be either clear grained aluminum or epoxy-polyester hybrid powder coat in the color as specified below.
10. Design Make:  
Chatsworth Products, Inc. (CPI), Standard Rack 3" D
  - a. Part Number 66353-E03, Standard Rack 3" D, 7'H x 20.3" W, 45U x 19" EIA, Glacier White, UL Listed.  
  
Panduit, 2-Post Rack, 3" D
  - a. Part Number R2PWH, 2-Post Rack 3" D, 7'H x 20.3" W, 45U x 19" EIA, White, UL Listed.

## 2.5 CABLE MANAGEMENT

### A. Vertical Cable Management for Racks/Frames

1. The vertical cable manager shall create a space for storing and organizing cables along the side of the rack/frame.
2. The cable manager shall maintain separation between patch/equipment/jumper cords and premise cables.
3. The vertical cable manager shall match the height of the rack(s)/frame(s).
4. The vertical cable manager shall bolt to the side of racks/frames with included hardware.
5. The cable manager shall be sized to match cabling requirements. Maximum cable fill shall be calculated by dividing 50% of the usable area within the cable manager by the area of a single cable.
6. A single vertical cable manager may be used in between bayed racks/frames if it is sized to match cable requirements for both racks/frames.
7. The vertical cable manager shall be double-sided and be a double-sided H-shaped trough with a front door and a rear door. The double-sided trough shall provide independent front and rear cable pathways. The front and rear sides of the cable manager shall have T-shaped cable guides separated by openings that align with each U space on the rack. The middle of the managers shall be mostly open to allow easy cable pass-through. Three movable mid-sections shall allow attachment of cable management accessories inside the cable manager. The movable mid-sections shall adjust front-to-rear to allow a 40/60, 50/50 or 60/40 front/rear split of the interior cable management space.
8. The door shall be removable, hinged to open from the right or left side, with a two-point latch and a single knob on the right and left side to secure the door in the closed position. The front door shall have a two-tone finish: black with a vertical aluminum panel at the center. The rear door on double-sided cable managers shall be flat with a black finish.
9. The T-shaped cable guides shall be made from a composite plastic material (not metal) and shall have rounded edges to protect cables. Openings between the T-shaped guides will be evenly spaced. When the cable manager is attached to a rack/frame, each cable opening shall align with a rack-mount space (U) on the rack/frame. Each opening shall pass a minimum of 24 each .25" OD patch cords.
10. The cable manager shall be delivered individually boxed, and available in several widths as specified below and in the contract documents.
11. The vertical cable manager shall be manufactured from steel, aluminum and plastic.
12. Finish shall be epoxy-polyester hybrid powder coat paint in the color as specified below and in the contract documents. T-shaped cable guides and latch hardware is black.
13. Optional internal cable management accessories will include cable management spools that attach to the panels/mid-sections to provide slack management for patch cords; a cable lashing bar kit to provide tie points for cable bundles at the rear/mid of the manager; and a fiber segregation kit that creates a separate pathway inside the manager to separate fiber from other cables.

14. Design Make shall be:  
Chatsworth Products, Inc. (CPI),  
Evolution™ Cable Management:
- a. Part Number 35523-E03, Evolution g2 Double-Sided Vertical Cable Manager, 7' High x 10" Wide x 24.5" Deep, Glacier White.
  - b. Part Number 35524-E03, Evolution g2 Double-Sided Vertical Cable Manager, 7' High x 12" Wide x 24.5" Deep, Glacier White.

Panduit  
PatchRunner 2 Enhanced Vertical Cable Manager

- a. Part Number PE2VD10WH, PatchRunner 2 Double-Sided Vertical Cable Manager, 7' High x 10" Wide x 26.8" Deep, White
- b. Part Number PE2VD12WH, PatchRunner 2 Double-Sided Vertical Cable Manager, 7' High x 12" Wide x 26.8" Deep, White

B. Horizontal Cable Management for Racks/Frames

- 1. The horizontal cable manager shall match the rack-mount width of the rack(s)/ frame(s).
- 2. The horizontal cable manager shall attach to the front or rear of the rack/frame with screws and shall be sized to fit in standard EIA-310-D or EIA-310-E Universal rack-mount spacing (1-3/4" high U).
- 3. The horizontal cable manager shall be a single-sided C-shaped trough with a cover. The front of the cable manager shall have T-shaped cable guides along the top and bottom surfaces of the cable manager. Evenly spaced cable openings in between the T-shaped cable guides shall allow cables to enter/exit the cable manager from/into the rack-mount space. The cover shall be removable, hinged to open up or down and shall snap on to secure the cover in the closed position.
- 4. The horizontal cable manager shall be delivered individually boxed, and available in the width(s) and height(s) as specified below and in the contract documents.
- 5. The horizontal cable manager shall be manufactured from steel, aluminum and plastic.
- 6. Finish shall be epoxy-polyester hybrid powder coat paint in the color as specified below and in the contract documents. Edge-protectors, T-shaped cable guides and latch hardware is white.
- 7. Design Make shall be:  
Chatsworth Products, Inc. (CPI),  
Evolution™ Cable Management:
  - a. Part Number 35441-E04, Evolution Single-Sided Horizontal Cable Manager, 4U x 19" EIA x 8.2" Deep, Glacier White.

Panduit,  
PatchRunner 2 Enhanced Horizontal Cable Managers

- b. Part Number PR2HF4WH, PatchRunner 2 Single-Sided Horizontal Cable Manager, 4U x 19" EIA 7.9" Deep, White.

## 2.6 LADDER RACK, SUPPORTS, AND ACCESSORIES

### A. Ladder Rack (Universal Cable Runway)

1. Ladder rack shall be manufactured from 3/8" (9.5 mm) wide by 1-1/2" (38 mm) high tubular steel with .065" (1.65 mm) wall thickness.
2. Ladder rack (side stringers) will be 9'-11 1/2" (3.0 m) long. Cross members will be welded in between stringers on 12" (300 mm) intervals/centers beginning 5-3/4" (146 mm) from one end so that there are 10 cross members per ladder rack. There will be 10-1/2" (267 mm) of open space in between each cross member.
3. Ladder rack will be delivered individually boxed, and available in the width(s) specified below.
4. Ladder rack will be UL Classified for suitability as an equipment grounding conductor only (the installer must remove paint or use ground straps at splices and intersections).
5. Finish shall be epoxy-polyester hybrid powder coat (paint) in the color(s) specified below.
6. Design Make:  
Chatsworth Products, Inc. (CPI),  
Universal Cable Runway:
  - a. Part Number 10250-E12, Universal Cable Runway, 12" (300 mm) Wide, Glacier White.
  - b. Part Number 10250-E18, Universal Cable Runway, 18" (460 mm) Wide, Glacier White.
  - c. Part Number 10250-E24, Universal Cable Runway, 24" (610 mm) Wide, Glacier White.
  - d. Part Number 10250-E31, Universal Cable Runway, 30" (760 mm) Wide, Glacier White.
  - e. Part Number 10250-E37, Universal Cable Runway, 36" (910 mm) Wide, Glacier White

### B. Horizontal 90° Turns (Cable Runway E-Bend)

1. Horizontal 90° turns shall be manufactured from 3/8" (9.5 mm) wide by 1-1/2" (38 mm) high tubular steel with .065" (1.65 mm) wall thickness.
2. Stringers (sides) will be formed in a 90° arc. Cross members will be welded in between stringers on approximate 23° increments so that there are 5 cross members per turn. The welded assembly will have a 15" (380 mm) inside radius and will create a smooth horizontal 90° turn.
3. Horizontal 90° turns will be available in the width(s) specified below.

4. Finish shall be epoxy-polyester hybrid powder coat (paint) in the color(s) specified below.  
Design Make:  
Chatsworth Products, Inc. (CPI),  
Cable Runway E-Bend:
  - a. Part Number 10822-E12, Cable Runway E-Bend, 12" (300 mm) Wide, Glacier White.
  - b. Part Number 10822-E18, Cable Runway E-Bend, 18" (460 mm) Wide, Glacier White.

C. Vertical-To-Horizontal 90° Turns (Cable Runway Outside Radius Bend)

1. Vertical-to-horizontal 90° turns shall be manufactured from 3/8" (9.5 mm) wide by 1-1/2" (38 mm) high tubular steel with .065" (1.65 mm) wall thickness.
2. Stringers (sides) will be formed in a 90° arc with a 12-1/2" (317.5 mm) outside radius. Cross members will be welded in between stringers on approximate 23° increments so that there are 3 cross members per turn. The welded assembly will create a smooth 90° vertical-to-horizontal turn.
3. Vertical-to-horizontal 90° turns will be available in width(s) specified below.
4. Finish shall be epoxy-polyester hybrid powder coat (paint) in the color(s) specified below.
5. Design Make:  
Chatsworth Products, Inc. (CPI),  
Cable Runway Outside Radius Bend:
  - a. Part Number 10723-E12, Outside Radius Bend, 12" (300 mm) Wide, Glacier White.
  - b. Part Number 10723-E15, Outside Radius Bend, 15" (380 mm) Wide, Glacier White.
  - c. Part Number 10723-E18, Outside Radius Bend, 18" (460 mm) Wide, Glacier White.
  - d. Part Number 10723-E20, Outside Radius Bend, 20" (510 mm) Wide, Glacier White.
  - e. Part Number 10723-E24, Outside Radius Bend, 24" (610 mm) Wide, Glacier White.

D. Horizontal-To-Vertical 90° Turns (Cable Runway Inside Radius Bend)

1. Horizontal-to-vertical 90° turns shall be manufactured from 3/8" (9.5 mm) wide by 1-1/2" (38 mm) high tubular steel with .065" (1.65 mm) wall thickness.
2. Stringers (sides) will be formed in a 90° arc with a 12-1/2" (317.5 mm) outside radius. Cross members will be welded in between stringers on approximate 23° increments so that there are 3 cross members per turn. The welded assembly will create a smooth 90° horizontal-to-vertical turn.
3. Horizontal-to-vertical 90° turns will be available in the width(s) specified below.
4. Finish shall be epoxy-polyester hybrid powder coat (paint) in the color(s) specified below.

5. Design Make:  
Chatsworth Products, Inc. (CPI),  
Cable Runway Inside Radius Bend:
  - a. Part Number 10724-E12, Inside Radius Bend, 12" (300 mm) Wide, Glacier White.
  - b. Part Number 10724-E15, Inside Radius Bend, 15" (380 mm) Wide, Glacier White.
  - c. Part Number 10724-E18, Inside Radius Bend, 18" (460 mm) Wide, Glacier White.
  - d. Part Number 10724-E20, Inside Radius Bend, 20" (510 mm) Wide, Glacier White.
  - e. Part Number 10724-E24, Inside Radius Bend, 24" (610 mm) Wide, Glacier White.

E. Corner Brackets (Cable Runway Corner Bracket)

1. Corner brackets shall be manufactured from 3/8" (9.5 mm) wide by 1-1/2" (38 mm) high tubular steel with .065" (1.65 mm) wall thickness.
2. The inside stringers of the corner bracket will be formed at 90° with a small chamfer at the vertex. The outside stringer of the corner bracket will be formed in a 90° arc that is either 15" (380 mm) or 24" (610 mm) in radius. A single cross member will connect the chamfered portion of the inside stringer to the outside stringer. The welded assembly will create a smooth 90° turn within the L-shaped corner created by two intersecting ladder racks.
3. Corner brackets will be available in the size(s) specified below. Installation hardware will be included with the corner bracket. Corner bracket installation hardware does not include the junction splice kit required to form the L-shaped intersection between two ladder racks.
4. Finish shall be epoxy-polyester hybrid powder coat (paint) in the color specified below.
5. Design Make:  
Chatsworth Products, Inc. (CPI),  
Cable Runway Corner Bracket:
  - a. Part Number 11959-E15, Corner Bracket, 15" (380 mm) Radius, Glacier White.
  - b. Part Number 11959-E24, Corner Bracket, 24" (610 mm) Radius, Glacier White.

F. Ladder Rack Splices

1. Splice kits will provide a method of mechanically connecting ladder rack sections and turns together end-to-end or side-to-end to form a continuous pathway for cables.

2. Grounding kits will provide a method of bonding ladder rack sections and turns together that is independent of the pathway splices. The grounding kit should be constructed of UL Listed components. The preferred solution is a #6 AWG green insulated stranded copper conductor connected on both ends to ladder rack using two-hole compression lugs and stainless-steel hardware.
3. An insulator bar kit will provide a means of electrically isolating individual ladder rack sections through an end-to-end splice separated with a non-conductive material. The preferred solution is a 3/8" (9.5 mm) wide by 1-1/2" (38 mm) high by 5-1/2" (140 mm) long insulator bar made of Delrin® (by DuPont, Delrin is a registered trademark of E.I. du Pont de Nemours and Company).
4. Splices (splice plates) will be manufactured from steel. Splice, grounding and insulator bar kits will include installation hardware.
5. Finish (of splice plates and hardware) shall be zinc plate in the color(s) specified below. Colors are applied as a chem. film over the zinc plate.
6. Design Make:  
Chatsworth Products, Inc. (CPI),  
Cable Runway Splices:
  - a. Compression splice for end-to-end connections.
    - 1) Part Number 11301-701, Butt-Splice Kit, Black.
  - b. Compression splice for T- or L-connections.
    - 1) Part Number 11302-701, Junction-Splice Kit, Black.
  - c. Bolted splice for end-to-end connections.
    - 1) Part Number 11299-701, Heavy-Duty Butt-Splice Kit, Black.
  - d. Bolted splice for T- or L- connections.
    - 1) Part Number 11298-701, Heavy-Duty Junction-Splice Kit, Black.
  - e. Compression splice for angled (non-90°) intersection connections.
    - 1) Part Number 10616-701, Adjustable Junction-Splice Kit, Black.
  - f. Compression splice for horizontal-to-vertical connections.
    - 1) Part Number 11314-701, 90° Runway-Splice Kit, Black.
  - g. Compression splice for horizontal-to-vertical connections.
    - 1) Part Number 11313-701, 45° Runway-Splice Kit, Black.
  - h. Compression splice for angled end-to-end connection (ramp up/down).
    - 1) Part Number 10487-701, Butt Swivel Splice Kit, Black.
  - i. Compression splice for angled T- or L- connection (ramp up/down).
    - 1) Part Number 10488-701, Junction Swivel Splice Kit, Black.
  - j. Compression splice for angled vertical connection (ramp up/down).
    - 1) Part Number 10489-701, Vertical Swivel Splice Kit, Black.
  - k. Bolted jumper that electrically bonds cable runway sections.
    - 1) Part Number 12061-001, Grounding Kit, Zinc.
  - l. Compression splice for end-to-end connection that electrically isolates cable runway sections
    - 1) Part Number 10842-001, Insulator Bar Kit, White.



G. Ladder Rack Supports

1. Supports will be sized to match the width of the ladder rack that is supported. Some supports will work with multiple or all widths of ladder rack.
2. Each support will include a means of mechanically securing ladder rack to the support.
3. Supports will be manufactured from steel or aluminum.
4. Finish shall be epoxy-polyester hybrid powder coat (paint) in the color(s) specified below. Included hardware shall be zinc plated with a gold chem. finish.
5. Design Make:  
Chatsworth Products, Inc. (CPI),  
Cable Runway Supports:
  - a. Wall support for side of cable runway. Installation requires (3) 5/16" or 8 mm lag bolts and (3) flat washers or concrete wall hardware (ordered separately).
    - 1) Part Number 11312-E12, Triangular Support Bracket, For 6"-12" (150 mm – 300 mm) Wide Cable Runway (Ladder Rack), 100 lb. (45.4 kg) Capacity, Aluminum, Glacier White.
    - 2) Part Number 11312-E18, Triangular Support Bracket, For 12"-18" (300 mm – 460 mm) Wide Cable Runway (Ladder Rack), 100 lb. (45.4 kg) Capacity, Aluminum, Glacier White.
    - 3) Wall support for side of cable runway. Installation requires (3) 5/16" or 8 mm lag bolts and (3) flat washers or concrete wall hardware (ordered separately).
    - 4) Part Number 11746-E12, Triangular Support Bracket, For 6" (150 mm) or 12" (300 mm) Wide Cable Runway (Ladder Rack), 400 lb. (181.4 kg) Capacity, Steel, Glacier White.
    - 5) Part Number 11746-E18, Triangular Support Bracket, For 18" (460 mm) Wide Cable Runway (Ladder Rack), 400 lb. (181.4 kg) Capacity, Steel, Glacier White.
    - 6) Part Number 11746-E24, Triangular Support Bracket, For 24" (610 mm) Wide Cable Runway (Ladder Rack), 400 lb. (181.4 kg) Capacity, Steel, Glacier White.
  - b. Wall support for end of cable runway. Installation requires (2) 5/16" or 8 mm lag bolts and (2) flat washers or concrete wall hardware (ordered separately).
    - 1) Part Number 11421-E12, Wall Angle Support Kit, For 12" (300 mm) Wide Cable Runway (Ladder Rack), Steel, Glacier White.
    - 2) Part Number 11421-E15, Wall Angle Support Kit, For 15" (380 mm) Wide Cable Runway (Ladder Rack), Steel, Glacier White.
    - 3) Part Number 11421-E18, Wall Angle Support Kit, For 18" (460 mm) Wide Cable Runway (Ladder Rack), Steel, Glacier White.
    - 4) Part Number 11421-E20, Wall Angle Support Kit, For 20" (510 mm) Wide Cable Runway (Ladder Rack), Steel, Glacier White.
    - 5) Part Number 11421-E24, Wall Angle Support Kit, For 24" (610 mm) Wide Cable Runway (Ladder Rack), Steel, Glacier White.



- c. Floor support for end of cable runway. (2) L-shaped bracket and (1) butt-splice kit. Installation requires (2) 3/8" or 10 mm lag bolts and (2) flat washers or concrete wall hardware (ordered separately).
  - 1) Part Number 11309-001, Foot Kit, Steel, Gold.
- d. Floor support for the bottom of cable runway. 1 pair of channels (2 supports). Includes 5/8" threaded rod and floor installation hardware. Requires accessory anchor installation tool (P/N 06003-001) or substitute) M16 threaded rod, (2) lock washers, (4) hex nuts and floor installation hardware (ordered separately).
  - 1) Part Number 11241-E12, Adjustable Floor Support Channel, For 12" (300 mm) Wide Cable Runway (Ladder Rack), 3" to 8" (80 mm to 200 mm) High, Steel, Glacier White.
  - 2) Part Number 11241-E15, Adjustable Floor Support Channel, For 15" (380 mm) Wide Cable Runway (Ladder Rack), 3" to 8" (80 mm to 200 mm) High, Steel, Glacier White.
  - 3) Part Number 11241-E18, Adjustable Floor Support Channel, For 18" (460 mm) Wide Cable Runway (Ladder Rack), 3" to 8" (80 mm to 200 mm) High, Steel, Glacier White.
- e. Ceiling support for the side of cable runway. Kit includes (1) threaded rod, hardware and connectors for cable runway and a concrete ceiling. Use in pairs at each point of support. Ceiling installation hardware not included.
  - 1) Part Number 11310-001, Threaded Ceiling Kit, Includes 3/8" Diameter x 6' L Rod, Steel, Gold.
  - 2) Part Number 11310-003, Threaded Ceiling Kit, Includes 5/8" Diameter x 6' L Rod, Steel, Gold.
  - 3) Part Number 11310-093, Threaded Ceiling Kit, Includes M10 Diameter x 2 m L Rod, Steel, Gold.
  - 4) Part Number 11310-094, Threaded Ceiling Kit, Includes M16 Diameter x 2 m L Rod, Steel, Gold.
- f. Center Support Kit is used with a single threaded rod to support cable runway from the bottom to the ceiling. One support is included per kit. Includes 5/8" Hex Nuts and Washers. Requires 5/8" rod and ceiling installation hardware or M16 rod, (2) hex nuts, (1 lock washer and ceiling installation hardware (ordered separately).
  - 1) Part Number 12362-E12, Center Support Kit, For 12" (300 mm) Wide Cable Runway (Ladder Rack), Steel, Glacier White.
  - 2) Part Number 12362-E15, Center Support Kit, For 15" (380 mm) Wide Cable Runway (Ladder Rack), Steel, Glacier White.
  - 3) Part Number 12362-E18, Center Support Kit, For 18" (460 mm) Wide Cable Runway (Ladder Rack), Steel, Glacier White.
  - 4) Part Number 12362-E24, Center Support Kit, For 24" (610 mm) Wide Cable Runway (Ladder Rack), Steel, Glacier White.

- g. Rack-To-Runway Mounting Plate attaches cable runway to the top of 2-post freestanding racks in parallel or perpendicular orientation. Includes J-bolt installation hardware for 1-1/2" (38 mm) High cable runway and rack top angles. CPI recommends use with Cable Runway Elevation Kit.
  - 1) Part Number 10595-E12, Rack-To-Runway Mounting Plate, for 9" to 12" (230 mm to 300 mm) Wide Cable Runway (Ladder Rack), for Standard and Universal Racks with 3" (80 mm) Deep Equipment Mounting Channels, Steel, Glacier White.
  - 2) Part Number 10595-E18, Rack-To-Runway Mounting Plate, for 15" to 18" (380 mm to 460 mm) Wide Cable Runway (Ladder Rack), for Standard and Universal Racks with 3" (80 mm) Deep Equipment Mounting Channels, Steel, Glacier White.
  - 3) Part Number 12408-E24, Rack-To-Runway Mounting Plate, for 20" (510 mm) and 24" (610 mm) Wide Cable Runway (Ladder Rack), for Standard and Universal Racks with 3" (80 mm) Deep Equipment Mounting Channels, Aluminum, Glacier White.
- h. Rack-To-Runway Mounting Plate attaches cable runway to the top of 2-post freestanding racks in parallel or perpendicular orientation. Includes J-bolt installation hardware for 1-1/2" (38 mm) high cable runway and rack top angles. CPI recommends use with Cable Runway Elevation Kit.
  - 1) Part Number 12121-E12, Rack-To-Runway Mounting Plate, for 9" to 12" (230 mm to 300 mm) Wide Cable Runway (Ladder Rack), for Standard Rack with 3" (150 mm) Deep Equipment Mounting Channels, Steel, Glacier White.
  - 2) Part Number 12121-E18, Rack-To-Runway Mounting Plate, for 15" to 18" (380 mm to 460 mm) Wide Cable Runway (Ladder Rack), for Standard Rack with 3" (150 mm) Deep Equipment Mounting Channels, Steel, Glacier White.
  - 3) Part Number 12409-E24, Rack-To-Runway Mounting Plate, for 20" (510 mm) and 24" (610 mm) Wide Cable Runway (Ladder Rack), for Standard Rack with 3" (150 mm) Deep Equipment Mounting Channels, Aluminum, Glacier White.
- i. Rack-To-Runway Mounting Plate with Bracket attaches cable runway to the top of 2-post freestanding racks in parallel or perpendicular orientation. Includes U-shaped rack bracket and installation hardware for 1-1/2" (38 mm) High Cable Runway and rack top angles. CPI recommends use with Cable Runway Elevation Kit.
  - 1) Part Number 12730-E12, Rack-To-Runway Mounting Plate with Bracket, for 9" to 12" (230 mm to 300 mm) Wide, for Standard and Universal Racks with 3" (80 mm) Deep Equipment Mounting Channels, Steel, Glacier White.

- 2) Part Number 12730-E18, Rack-To-Runway Mounting Plate with Bracket, for 15" to 18" (380 mm to 460 mm) Wide, for Standard and Universal Racks with 3" (80 mm) Deep Equipment Mounting Channels, Steel, Glacier White.
  - 3) Part Number 13730-E24, Rack-To-Runway Mounting Plate with Bracket, for 20" (510 mm) and 24" (610 mm) Wide, for Standard and Universal Racks with 3" (80 mm) Deep Equipment Mounting Channels, Aluminum, Glacier White.
- j. Rack-To-Runway Mounting Plate with Bracket attaches cable runway to the top of 2-post freestanding racks in parallel or perpendicular orientation. Includes U-shaped rack bracket and installation hardware for 1-1/2" (38 mm) High Cable Runway and rack top angles. CPI recommends use with Cable Runway Elevation Kit.
- 1) Part Number 12731E12, Rack-To-Runway Mounting Plate with Bracket, for 9" to 12" (230 mm to 300 mm) Wide Cable Runway (Ladder Rack), for Standard Rack with 3" (150 mm) Deep Equipment Mounting Channels, Steel, Glacier White.
  - 2) Part Number 12731-E18, Rack-To-Runway Mounting Plate with Bracket, for 15" to 18" (380 mm to 460 mm) Wide Cable Runway (Ladder Rack), for Standard Rack with 3" (150 mm) Deep Equipment Mounting Channels, Steel, Glacier White.
  - 3) Part Number 12731-E24, Rack-To-Runway Mounting Plate with Bracket, for 20" (510 mm) and 24" (610 mm) Wide Cable Runway (Ladder Rack), for Standard Rack with 3" (150 mm) Deep Equipment Mounting Channels, Aluminum, Glacier White.
- k. Cable Runway Elevation Kit are L-shaped supports that elevate cable runway 2" (50 mm), 2-1/2" (64 mm), 3" (80 mm) or 4" (100 mm), 5" (130 mm), 6" (150 mm) above the rack or cabinet. May also be used to support cable runway vertically against a wall with a standoff from the wall. Kits for racks must be used with a Rack-To-Runway Mounting Plate. Includes installation hardware for Rack-to-Runway Mounting Plates and Cabinets. Order installation hardware for wall separately.
- 1) Part Number 10506-E02, Cable Runway Elevation Kit, 2" (50 mm), 2-1/2" (64 mm) or 3" (80 mm) High, for Racks, Steel, Glacier White.
  - 2) Part Number 10506-E06, Cable Runway Elevation Kit, 4" (100 mm), 5" (130 mm) or 6" (150 mm) High, for Racks, Steel, Glacier White.
  - 3) Part Number 10506-E12, Cable Runway Elevation Kit, 2" (50 mm), 2-1/2" (64 mm) or 3" (80 mm) High, for Cabinets, Steel, Glacier White.
  - 4) Part Number 10506-E16, Cable Runway Elevation Kit, 4" (100 mm), 5" (130 mm) or 6" (150 mm) High, for Cabinets, Steel, Glacier White.

- I. Support a second tier of cable runway 12" (300 mm) above the first tier of cable runway with Cable Runway Standoff Kit. Includes one pair of supports and installation hardware.
    - 1) Part Number 31470-E12, Cable Runway Standoff Kit, 12" (300 mm) High, Steel, Glacier White.
  - m. Attach cable runway to the wall or floor with no standoff. 1/4" or M6 installation hardware not included.
    - 1) Part Number 10608-001, Vertical Wall Brackets, 1 pair, Steel, Gold.
  - n. Pipe stands include 1/4" concrete floor installation hardware. Use with cable runway center support kit and 5/8-11 threaded rod.
    - 1) Part Number 10684-E01, Tall Pipe Stand, 2" (50 mm) Diameter x 79" (2010 mm) High, Glacier White. Use for 7' (2.1 m) high supports.
    - 2) Part Number 10684-E02, Tall Pipe Stand, 2" (50 mm) Diameter x 85" (2160 mm) High, Glacier White. Use for 7'-6" (2.3 m) high supports.
    - 3) Part Number 10684-E03, Tall Pipe Stand, 2" (50 mm) Diameter x 91" (2310 mm) High, Glacier White. Use for 8' (2.4 m) high supports.
    - 4) Part Number 10684-E04, Tall Pipe Stand, 2" (50 mm) Diameter x 103" (2620 mm) High, Glacier White. Use for 9' (2.7 m) high supports.
  - o. Adjustable floor support stands include framing bar clamps, threaded rod and hardware. Floor installation hardware is not included. Order 1/4" floor installation hardware separately.
    - 1) Part Number 11235-E01, Adjustable Floor Support Stands, 5" to 6" (130 mm to 150 mm) High, 1 pair, Glacier White.
    - 2) Part Number 11236-E01, Adjustable Floor Support Stands, 6" to 8" (150 mm to 200 mm) High, 1 pair, Glacier White.
    - 3) Part Number 11237-E01, Adjustable Floor Support Stands, 8" to 10" (200 mm to 300 mm) High, 1 pair, Glacier White.
- H. Ladder Rack Accessories
- 1. Cable straps used for attaching cable bundles to the ladder rack cross members must be reusable with a hook and loop-style closure, at least 3/4" (19 mm) wide, and sized for cable bundles that are 2" (50 mm), 3" (80 mm) or 4" (100 mm) in diameter.

2. Cable retaining posts used to keep cable from falling off of the side of the ladder rack shall be manufactured from 1" (25 mm) by 1/2" (12.7 mm) tubular steel with .065" (1.65 mm) wall thickness. Cable retaining posts will be 8" (200 mm) high and will attach to the side stringer of the ladder rack with included hardware. The top of the cable retaining posts will be fitted with a rubberized end cap to protect cables.
3. End caps used to cover the ends of ladder rack will be manufactured from a black fire-retardant rubberized material. End caps will be sized for 3/8" (9.5 mm) wide by 1-1/2" (38 mm) high side stringers and will be sold in pairs.
4. End closing kits used to cover the end of ladder rack will be manufactured from 3/8" (9.5 mm) wide by 1-1/2" (38 mm) high tubular steel with .065" (1.65 mm) wall thickness. Kits will consist of a bar cut to match the width of the ladder rack and the hardware required to attach the bar to the end of a length of ladder rack.
5. Radius drops used to create a radius to form cables over as the cables exit or enter the ladder rack will be manufactured from aluminum extrusion. The extrusion will be formed in a 90° arc with a minimum bend radius of 3" (75 mm). Radius drops will attach to either the side stringer or the cross member of the ladder rack using a clevis pin. Radius drops will include 1-1/2" (38 mm) high cable spools that attach to the top of the radius drop to guide cables.
6. Movable cross members used to support cross member radius drops in between welded cross members on ladder rack will be manufactured from 3/8" (9.5 mm) by 1-1/2" (38 mm) aluminum bar. Movable cross members will attach to ladder rack at the side stringers with included hardware so that the location of the movable cross member can be adjusted. Moveable cross member will support a cross-member radius drop.
7. Cable spools used to separate ladder rack into multiple cable pathways will be made from a black flame-retardant ABS. Cable spools will attach to the cross members with a clip that allows the width of the ladder rack to be divided into any proportion. The spools will be 3.94" (100 mm) tall, with a 1.94" (49 mm) diameter top cap, and a body that tapers from .88" (22 mm) diameter at the top to .62" (16mm) diameter at the bottom.
8. Auxiliary support brackets used to support cables that should be physically separated from the cables in the ladder rack will be made from 1/8" (3 mm) by 1" (25 mm) steel bar. The bracket will be L-shaped and will attach to the side stringer of the ladder rack. The bracket will hang below the ladder rack a minimum of 4" (100 mm). The bracket support surface will be 4" (100 mm) long. The bracket will be zinc plated with a gold chem. finish.
9. Touch-up paint used on ladder rack and ladder rack system components will be color-matched to the finish on the ladder rack or component. A spray on and brush on option will be available.
10. Unless otherwise noted, finish on all metal components shall be epoxy-polyester hybrid powder coat (paint) in the color(s) specified below. Hardware will be zinc plated with a gold chem. finish.

11. Design Make:  
Chatsworth Products, Inc. (CPI),  
Cable Runway Accessories:
- a. Part Number 02006-203, Saf-T-Grip Reusable Cable Management Straps, Open Loop Series, 3/4" (19 mm) Wide by 6" (150 mm) Long for 2" (50 mm) Diameter Cable Bundles, Package of 25, Royal Blue.
  - b. Part Number 02009-203, Saf-T-Grip Reusable Cable Management Straps, Open Loop Series, 3/4" (19 mm) Wide by 9" (230 mm) Long for 3" (80 mm) Diameter Cable Bundles, Package of 25, Royal Blue.
  - c. Part Number 02012-203, Saf-T-Grip Reusable Cable Management Straps, Open Loop Series, 3/4" (19 mm) Wide by 12" (300 mm) Long for 4" (100 mm) Diameter Cable Bundles, Package of 25, Royal Blue.
  - d. Part Number 05006-203, Saf-T-Grip Reusable Cable Management Straps, End Grommet & Buckle Series, 3/4" (19 mm) Wide by 6" (150 mm) Long for 2" (50 mm) Diameter Cable Bundles, Package of 25, Royal Blue.
  - e. Part Number 05009-203, Saf-T-Grip Reusable Cable Management Straps, End Grommet & Buckle Series, 3/4" (19 mm) Wide by 9" (230 mm) Long for 3" (80 mm) Diameter Cable Bundles, Package of 25, Royal Blue.
  - f. Part Number 05012-203, Saf-T-Grip Reusable Cable Management Straps, End Grommet & Buckle Series, 3/4" (19 mm) Wide by 12" (300 mm) Long for 4" (100 mm) Diameter Cable Bundles, Package of 25, Royal Blue.
  - g. Part Number 10596-708, Cable Retaining Post, 8" (200 mm) High, Black.
  - h. Part Number 10642-001, Cable Runway Protective End Caps, 1 Pair, Black.
  - i. Part Number 11700-E12, End Closing Kit, For 12" (300 mm) Wide Cable Runway (Ladder Rack), Glacier White.
  - j. Part Number 11700-E15, End Closing Kit, For 15" (380 mm) Wide Cable Runway (Ladder Rack), Glacier White.
  - k. Part Number 11700-E18, End Closing Kit, For 18" (460 mm) Wide Cable Runway (Ladder Rack), Glacier White.
  - l. Part Number 11700-E20, End Closing Kit, For 20" (510 mm) Wide Cable Runway (Ladder Rack), Glacier White.
  - m. Part Number 11700-E24, End Closing Kit, For 24" (610 mm) Wide Cable Runway (Ladder Rack), Glacier White.
  - n. Part Number 12100-E12, Cross Member Radius Drop, 11" (280 mm) Wide, Glacier White. Fits 12" (300 mm) Wide Cable Runway (Ladder Rack).
  - o. Part Number 12100-E18, Cross Member Radius Drop, 17" (430 mm) Wide, Glacier White. Fits 18" (460 mm) Wide Cable Runway (Ladder Rack).
  - p. Part Number 12101-E01, Side Stringer Radius Drop, Universal Cable Runway, Glacier White.

- q. Part Number 12115-E12, Movable Cross Member, for 12" (300 mm) Wide Cable Runway and 8" (200 mm) Wide Radius Drop, Glacier White.
- r. Part Number 12115-E18, Movable Cross Member, for 18" (460 mm) Wide Cable Runway and 11" (280 mm) Wide Radius Drop, Glacier White.
- s. Part Number 13392-E11, Cable Runway Dividers, Package of 5, Glacier White.
- t. Part Number 13392-E12, Cable Runway Dividers, Package of 25, Glacier White.
- u. Part Number 11268-001, L-Bracket, 4" (100 mm) High x 4" (100 mm) Long, Gold over Zinc.
- v. Part Number 25400-E00, Touch-Up Paint in Spray Can, Glacier White.
- w. Part Number 25401-E00, Touch-Up Paint in 1oz. Bottle, Glacier White.

I. Miscellaneous Hardware

- 1. Design Make:  
Chatsworth Products, Inc. (CPI),  
Miscellaneous Hardware:
  - a. Part Number 11440-001, Threaded Drop Rod, 3/8-16 UNC-2A rod, 6' Long, Gold.
  - b. Part Number 11440-002, Threaded Drop Rod, 5/8-11 UNC-2A rod, 6' Long, Gold.
  - c. Part Number 11440-003, Threaded Drop Rod, 3/8-16 UNC-2A rod, 12' Long, Gold.
  - d. Part Number 11440-004, Threaded Drop Rod, 5/8-11 UNC-2A rod, 12' Long, Gold.
  - e. Part Number 11440-005, Threaded Drop Rod, 5/8-11 UNC-2A rod, 8' Long, Gold.
  - f. Part Number 11440-006, Threaded Drop Rod, 5/8-11 UNC-2A rod, 4' Long, Gold.
  - g. Part Number 11440-007, Threaded Drop Rod, 5/8-11 UNC-2A rod, 6" Long, Gold.
  - h. Part Number 11440-008, Threaded Drop Rod, 5/8-11 UNC-2A rod, 8" Long, Gold.
  - i. Part Number 11440-009, Threaded Drop Rod, 5/8-11 UNC-2A rod, 5.5" Long, Gold.
  - j. Part Number 11440-012, Threaded Drop Rod, 5/8-11 UNC-2A rod, 1' Long, Gold.
  - k. Part Number 11440-024, Threaded Drop Rod, 5/8-11 UNC-2A rod, 2' Long, Gold.
  - l. Part Number 11440-036, Threaded Drop Rod, 5/8-11 UNC-2A rod, 3' Long, Gold.
  - m. Part Number 11440-091, Threaded Drop Rod, M10 x 1.5 Rod, 1 m Long, Gold



- n. Part Number 11440-092, Threaded Drop Rod, M16 x 2 Rod, 2 m Long, Gold
- o. Part Number 11440-093, Threaded Drop Rod, M10 x 1.5 Rod, 2 m Long, Gold
- p. Part Number 11440-094, Threaded Drop Rod, M16 x 2 Rod, 2 m Long, Gold
- q. Part Number 11440-095, Threaded Drop Rod, M10 x 1.5 Rod, 3 m Long, Gold
- r. Part Number 11440-096, Threaded Drop Rod, M16 x 2 Rod, 3 m Long, Gold
- s. Part Number 10697-001, Threaded Rod Coupling Kit, for 3/8-16 UNC-2A rods, Gold.
- t. Part Number 10697-002, Threaded Rod Coupling Kit, for 5/8-11 UNC-2A rods, Gold.
- u. Part Number 11085-001, Threaded Rod Cover, 10' (3 m) Long, Plastic, Gray.
- v. Part Number 10557-001, Threaded Rod I-Beam Clamp, for 3/8-16 UNC-2A rod, Gold.
- w. Part Number 10557-003, Threaded Rod I-Beam Clamp, for 5/8-11 UNC-2A rod, Gold.
- x. Part Number 11408-001, Cable Runway Support Bracket, for 3/8" or M10 drop rod and 1-1/2" (38 mm) High Cable Runway, Gold.
- y. Part Number 11408-003, Cable Runway Support Bracket, for 5/8" or M16 drop rod and 1-1/2" (38 mm) High Cable Runway, Gold.
- z. Part Number 11406-001, Ceiling Support Bracket, for 3/8" or M10 drop rod, Gold.
- aa. Part Number 11406-002, Ceiling Support Bracket, for 5/8" or M16 drop rod, Gold.
- bb. Part Number 10607-002, Cable Runway Slotted Support Bracket, for 3/8" or M10 drop rod and 1-1/2" (38 mm) High Cable Runway, Gold.
- cc. Part Number 10607-001, Cable Runway Slotted Support Bracket, for 5/8" or M16 drop rod and 1-1/2" (38 mm) High Cable Runway, Gold.
- dd. Part Number 10873-001, Slip-On Cable Runway Support Bracket, for 5/8" drop rod, Gold.
- ee. Part Number 03003-001, Slip-On Lock Nut, for 3/8-16 UNC-2A rod, Zinc plated.
- ff. Part Number 03003-002, Slip-On Lock Nut, for 5/8-11 UNC-2A rod, Zinc plated.
- gg. Part Number 20142-071, Hex Nut, 1/4-20, Gold.
- hh. Part Number 20142-081, Hex Nut, 5/16-18, Gold.
- ii. Part Number 20142-091, Hex Nut, 3/8-16, Gold.
- jj. Part Number 03001-001, Hex Nut, 1/2-13, Gold.
- kk. Part Number 20142-111, Hex Nut, 5/8-11, Gold.
- ll. Part Number 04003-002, Split Lock Washer, 1/4, Gold.



- mm. Part Number 20141-080, Split Lock Washer, 5/16, Gold.
- nn. Part Number 20142-090, Split Lock Washer, 3/8, Gold.
- oo. Part Number 20141-100, Split Lock Washer, 1/2, Gold.
- pp. Part Number 04003-001, Split Lock Washer, 5/8, Gold
- qq. Part Number 04002-002, Washer, Type A Plain, 3/8, Gold.
- rr. Part Number 04002-001, Washer, Type A Plain, 5/8, Gold.
- ss. Part Number 02007-004, Hex Lag Screw, 1/4-10 x 2" Long, Gold.
- tt. Part Number 02006-001, Hex Lag Screw, 1/2-6 x 2" Long, Gold.
- uu. Part Number 20098-832, Hex Lag Screw, 3/8-7 x 2" Long, Gold.
- vv. Part Number 02006-002, Hex Lag Screw, 5/8-5 x 2" Long, Gold.
- ww. Part Number 20067-001, Anchor, 3/8-16 x Expansion Shield, Zinc.
- xx. Part Number 06001-004, Anchor, 5/8-11 Multi-set, Zinc.
- yy. Part Number 06003-001, Anchor Setting Tool, for P/N 06001-004.

## 2.7 ADJUSTABLE CABLE RUNWAY

### A. Adjustable Cable Runway

1. Adjustable Cable Runway Stringers (sides) shall be manufactured from 1.5"H (38 mm) x 0.4" W (10 mm) roll-formed steel with 0.075" (1.90 mm) wall thickness.
2. Adjustable Cable Runway Cross Members (rungs) will be manufactured from 1.5" W x .80" D (20.3 mm x 38.1 mm) extruded aluminum with .090" (2.29 mm) wall thickness.
3. Adjustable Cable Runway Stringers will be 119.5" L (3035 mm). Stringers shall include a repeating hole pattern identifying a 12" spacing between Cross Members. Cross members will be attached to Stringers with thread-forming screws on 12" (305 mm) centers beginning 5.75" (146 mm) from one end. There are ten Cross Members per ladder rack. There will be 10.5" (266.7 mm) of open space in between each cross member.
4. Adjustable Cable Runway will be delivered preassembled or unassembled, boxed, and available in several widths and finishes as specified below and in the contract documents.
5. When delivered assembled, Adjustable Cable Runway Cross Members will be attached to Stringers using (20) M8x20, Taptite, Thread-Forming Screws in Zinc Plated or Black-Zinc Plated Finish.
6. Touch-up paint used on ladder rack and ladder rack system components will be color-matched to the finish on the ladder rack or component. Spray-on and bottled paint options will be available.
7. Unless otherwise noted, finish on all metal components shall be epoxy-polyester hybrid powder coat (paint) in the color(s) specified below.

8. Design Make:  
Chatsworth Products (CPI),  
Adjustable Cable Runway:
  - a. Part Number 14300-E12 Adjustable Cable Runway, 12" W (305 mm), Glacier White.
  - b. Part Number 14300-E15 Adjustable Cable Runway, 15" W (381 mm), Glacier White.
  - c. Part Number 14300-E18 Adjustable Cable Runway, 18" W (457 mm), Glacier White.
  - d. Part Number 14300-E24 Adjustable Cable Runway, 24" W (610 mm), Glacier White.
  - e. Part Number 14300-E30 Adjustable Cable Runway, 30" W (762 mm), Glacier White.
  - f. Part Number 14300-E36 Adjustable Cable Runway, 36" W (914 mm), Glacier White.

B. Cross Member Kit, Adjustable Cable Runway

1. Cross Member Kits contain Packages of (10) or (50) Adjustable Cable Runway Tool-less Cross Members (rungs), which will be made from 1.5" W x 80"H (38.1 mm x 20.9 mm) extruded aluminum with .09" (2.29 mm) wall thickness.
2. Finishes and Widths shall be as specified below and in the contract documents.
3. Cross Member Kits contain the following hardware:
4. (20) M8x20, Taptite, Thread-Forming Black Zinc-Plated Screws for (10) Qty Packages for Gray and Black Cross Members.
5. Design Make:  
Chatsworth Products (CPI),  
Cross Member Kit, Adjustable Cable Runway
  - a. Part Number 14302-E12, Cross Member Kit, Adjustable Cable Runway, 12"W (305 mm), 10 Pack, Glacier White.
  - b. Part Number 14302-E15, Cross Member Kit, Adjustable Cable Runway, 15"W (381 mm), 10 Pack, Glacier White.
  - c. Part Number 14302-E18, Cross Member Kit, Adjustable Cable Runway, 18"W (457 mm), 10 Pack, Glacier White.
  - d. Part Number 14302-E24, Cross Member Kit, Adjustable Cable Runway, 24"W (610 mm), 10 Pack, Glacier White.
  - e. Part Number 14302-E30, Cross Member Kit, Adjustable Cable Runway, 30"W (762 mm), 10 Pack, Glacier White.
  - f. Part Number 14302-E36, Cross Member Kit, Adjustable Cable Runway, 36"W (914 mm), 10 Pack, Glacier White.
  - g. Part Number 14302-E62, Cross Member Kit, Adjustable Cable Runway, 12"W (305 mm), 50 Pack, Glacier White.
  - h. Part Number 14302-E65, Cross Member Kit, Adjustable Cable Runway, 15"W (381 mm), 50 Pack, Glacier White.
  - i. Part Number 14302-E68, Cross Member Kit, Adjustable Cable Runway, 18"W (457 mm), 50 Pack, Glacier White.

- j. Part Number 14302-E74, Cross Member Kit, Adjustable Cable Runway, 24"W (610 mm), 50 Pack, Glacier White.

C. Stringer Kit, Adjustable Cable Runway

- 1. Packages of 10 Adjustable Cable Runway Stringers (sides) for use in extending the pathway of Adjustable Cable Runway installations
- 2. Adjustable Cable Runway Stringers (sides) shall be manufactured from roll-formed steel. The Stringers will be made from 1-1/2"H x 0.4"W (38 mm x 10 mm) roll-formed steel with 0.075" (1.90 mm) wall thickness. Stringers shall include a repeating hole pattern identifying a 12" spacing between Cross Members. Stringers Kits do not contain hardware.
- 3. Finishes are as specified below and in the contract documents.
- 4. Design Make:  
Chatsworth Products (CPI),  
Adjustable Cable Runway Stringer Kit:

- a. Part Number 14303-E10, Stringer Kit, Adjustable Cable Runway, 1.5"H x 0.4"W x 119.5"L (38 mm x 10 mm x 3035 mm), 10 Pack, Glacier White.

D. Horizontal 90° Turns (Cable Runway E-Bend)

- E. Horizontal 90° turns shall be manufactured from 1-1/2"H x 3/8" W (9.5 x mm 38 mm) tubular steel with .065" (1.65 mm) wall thickness.

- F. Stringers (sides) will be formed in a 90° arc. Cross members will be welded in between Stringers on approximate 23° increments so that there are 5 Cross Members per turn. The welded assembly will have a 15" (380 mm) inside radius and will create a smooth horizontal 90° turn.

G. Horizontal 90° turns will be available in the width(s) specified below.

- 1. Finish shall be epoxy-polyester hybrid powder coat (paint) in the color(s) specified below.
- 2. Design Make:  
Chatsworth Products (CPI),  
Cable Runway E-Bend:
  - a. Part Number 10822-E12, Cable Runway E-Bend, 12" W (300 mm), Glacier White.
  - b. Part Number 10822-E15, Cable Runway E-Bend, 15" W (380 mm), Glacier White.
  - c. Part Number 10822-E18, Cable Runway E-Bend, 18" W (460 mm), Glacier White.
  - d. Part Number 10822-E24, Cable Runway E-Bend, 24" W (610 mm), Glacier White.
  - e. Part Number 10822-E31, Cable Runway E-Bend, 30" W (760 mm), Glacier White.

- f. Part Number 10822-E37, Cable Runway E-Bend, 36" W (910 mm), Glacier White.

H. Vertical-To-Horizontal 90° Turns (Cable Runway Outside Radius Bend)

1. Vertical-to-horizontal 90° turns shall be manufactured from 1-1/2"H x 3/8" W (38 mm x 9.5 mm) tubular steel with .065" (1.65 mm) wall thickness.
2. Stringers (sides) will be formed in a 90° arc with a 12-1/2" (317.5 mm) outside radius. Cross members will be welded in between Stringers on approximate 23° increments so that there are 3 Cross Members per turn. The welded assembly will create a smooth 90° vertical-to-horizontal turn.
3. Vertical-to-horizontal 90° turns will be available in width(s) specified below.
4. Finish shall be epoxy-polyester hybrid powder coat (paint) in the color(s) specified below.
5. Design Make:  
Chatsworth Products (CPI),  
Cable Runway Outside Radius Bend:
  - a. Part Number 10723-E12, Outside Radius Bend, 12" W (300 mm), Glacier White.
  - b. Part Number 10723-E15, Outside Radius Bend, 15" W (380 mm), Glacier White.
  - c. Part Number 10723-E18, Outside Radius Bend, 18" W (460 mm), Glacier White.
  - d. Part Number 10723-E24, Outside Radius Bend, 24" W (610 mm), Glacier White.
  - e. Part Number 10723-E31, Outside Radius Bend, 30" W (760 mm), Glacier White.
  - f. Part Number 10723-E37, Outside Radius Bend, 24" W (910 mm), Glacier White.

I. Horizontal-To-Vertical 90° Turns (Cable Runway Inside Radius Bend)

1. Horizontal-to-vertical 90° turns shall be manufactured from 1-1/2"H x 3/8" W (38 mm x 9.5 mm) tubular steel with .065" (1.65 mm) wall thickness.
2. Stringers (sides) will be formed in a 90° arc with a 12-1/2" (317.5 mm) outside radius. Cross members will be welded in between Stringers on approximate 23° increments so that there are 3 Cross Members per turn. The welded assembly will create a smooth 90° horizontal-to-vertical turn.
3. Horizontal-to-vertical 90° turns will be available in the width(s) specified below.
4. Finish shall be epoxy-polyester hybrid powder coat (paint) in the color(s) specified below.
5. Design Make:  
Chatsworth Products (CPI),  
Cable Runway Inside Radius Bend:
  - a. Part Number 10724-E12, Inside Radius Bend, 12" W (300 mm), Glacier White.
  - b. Part Number 10724-E15, Inside Radius Bend, 15" W (380 mm), Glacier White.

- c. Part Number 10724-E18, Inside Radius Bend, 18" W (460 mm), Glacier White.
- d. Part Number 10724-E24, Inside Radius Bend, 24" W (610 mm), Glacier White.
- e. Part Number 10724-E31, Inside Radius Bend, 30" W (760 mm), Glacier White.
- f. Part Number 10724-E37, Inside Radius Bend, 36" W (910 mm), Glacier White.

J. Corner Brackets (Cable Runway Corner Bracket)

- 1. Corner brackets shall be manufactured from 1-1/2"H x 3/8" W (38 mm x 9.5 mm) tubular steel with .065" (1.65 mm) wall thickness.
- 2. The inside Stringers of the corner bracket will be formed at 90° with a small chamfer at the vertex. The outside stringer of the corner bracket will be formed in a 90° arc that is either 15" (380 mm) or 24" (610 mm) in radius. A single cross member will connect the chamfered portion of the inside stringer to the outside stringer. The welded assembly will create a smooth 90° turn within the L-shaped corner created by two intersecting ladder racks.
- 3. Corner brackets will be available in the size(s) specified below. Installation hardware will be included with the corner bracket. Corner bracket installation hardware does not include the junction splice kit required to form the L-shaped intersection between two ladder racks.
- 4. Finish shall be epoxy-polyester hybrid powder coat (paint) in the color specified below.
- 5. Design Make:  
Chatsworth Products (CPI),  
Cable Runway Corner Bracket:
  - a. Part Number 11959-E15, Corner Bracket, 15" (380 mm) Radius, Glacier White.
  - b. Part Number 11959-E24, Corner Bracket, 24" (610 mm) Radius, Glacier White.

K. Ladder Rack Splices

- 1. Splice kits will provide a method of mechanically connecting ladder rack sections and turns together end-to-end or side-to-end to form a continuous pathway for cables.
- 2. Splices (splice plates) will be manufactured from steel. Splice, grounding and insulator bar kits will include installation hardware.
- 3. Finish (of splice plates and hardware) shall be zinc plate in the color(s) specified below. Colors are applied as a chem. film over the zinc plate.
- 4. Design Make:  
Chatsworth Products (CPI),  
Cable Runway Splices:  
Compression splice for end-to-end connections.
  - a. Part Number 11301-701, Butt-Splice Kit, Black. Compression splice for T- or L-connections.
  - b. Part Number 11302-701, Junction-Splice Kit, Black.

L. Ladder Rack Supports

1. Supports will be sized to match the width of the ladder rack that is supported. Some supports will work with multiple or all widths of ladder rack.
2. Each support will include a means of mechanically securing ladder rack to the support.
3. Supports will be manufactured from steel or aluminum.
4. Finish shall be epoxy-polyester hybrid powder coat (paint) in the color(s) specified below. Included hardware shall be zinc plated with a gold chem. finish.
5. Design Make:  
Chatsworth Products (CPI),  
Cable Runway Supports:
  - a. Part Number 11421-E12, Wall Angle Support Kit, For 12" W (300 mm) Cable Runway (Ladder Rack), Steel, Glacier White.
  - b. Part Number 11421-E15, Wall Angle Support Kit, For 15" W (380 mm) Cable Runway (Ladder Rack), Steel, Glacier White.
  - c. Part Number 11421-E18, Wall Angle Support Kit, For 18" W (460 mm) Cable Runway (Ladder Rack), Steel, Glacier White.
  - d. Part Number 11421-E24, Wall Angle Support Kit, For 24" W (610 mm) Cable Runway (Ladder Rack), Steel, Glacier White.
  - e. Part Number 11421-E30, Wall Angle Support Kit, For 30" W (760 mm) Cable Runway (Ladder Rack), Steel, Glacier White.
  - f. (Wall support for end of cable runway. Installation requires (2) 5/16" or 8 mm lag bolts and (2) flat washers or concrete wall hardware (ordered separately).
  - g. Part Number 11309-E01, Foot Kit, Steel, Glacier White. Floor support for end of cable runway. (2) L-shaped bracket and (1) butt-splice kit. Installation requires (2) 3/8" or 10 mm lag bolts and (2) flat washers or concrete wall hardware (ordered separately).
  - h. Part Number 11241-E12, Adjustable Floor Support Channel, For 12" W (300 mm) Cable Runway (Ladder Rack), 3"H to 8"H (80 mm to 200 mm), Steel, Glacier White.
  - i. Part Number 11241-E15, Adjustable Floor Support Channel, For 15" W (380 mm) Cable Runway (Ladder Rack), 3"H to 8"H (80 mm to 200 mm), Steel, Glacier White.
  - j. Part Number 11241-E18, Adjustable Floor Support Channel, For 3"H to 8"H (80 mm to 200 mm) x 18" W (460 mm) Cable Runway (Ladder Rack), Steel, Glacier White.
  - k. Floor support for the bottom of cable runway. 1 pair of channels (2 supports). Includes 5/8" threaded rod and floor installation hardware. Requires accessory anchor installation tool (P/N 06003-001) or substitute) M16 threaded rod, (2) lock washers, (4) hex nuts and floor installation hardware (ordered separately).
  - l. Part Number 11310-001, Threaded Ceiling Kit, Includes 3/8" Diameter x 6'L Rod, Steel, Gold.
  - m. Part Number 11310-003, Threaded Ceiling Kit, Includes 5/8" Diameter x 6'L Rod, Steel, Gold.

- n. Part Number 11310-093, Threaded Ceiling Kit, Includes M10 Diameter x 2 m L Rod, Steel, Gold.
- o. Part Number 11310-094, Threaded Ceiling Kit, Includes M16 Diameter x 2 m L Rod, Steel, Gold.
- p. Ceiling support for the side of cable runway. Kit includes (1) threaded rod, hardware and connectors for cable runway and a concrete ceiling. Use in pairs at each point of support. Ceiling installation hardware not included.
- q. Part Number 12362-E12, Center Support Kit, For 12" W (300 mm) Cable Runway (Ladder Rack), Steel, Glacier White.
- r. Part Number 12362-E15, Center Support Kit, For 15" W (380 mm) Cable Runway (Ladder Rack), Steel, Glacier White.
- s. Part Number 12362-E18, Center Support Kit, For 18" W (460 mm) Cable Runway (Ladder Rack), Steel, Glacier White.
- t. Part Number 12362-E24, Center Support Kit, For 24" W (610 mm) Cable Runway (Ladder Rack), Steel, Glacier White.
- u. Center Support Kit is used with a single threaded rod to support cable runway from the bottom to the ceiling. One support is included per kit. Includes 5/8" Hex Nuts and Washers. Requires 5/8" rod and ceiling installation hardware or M16 rod, (2) hex nuts, (1 lock washer and ceiling installation hardware (ordered separately).
- v. Part Number 10595-E12, Rack-To-Runway Mounting Plate, for 9" W to 12" W (230 mm to 300 mm) Cable Runway (Ladder Rack), for Standard and Universal Racks with 3" D (80 mm) Equipment Mounting Channels, Steel, Glacier White.
- w. Part Number 10595-E18, Rack-To-Runway Mounting Plate, for 15" W to 18" W (380 mm to 460 mm) Cable Runway (Ladder Rack), for Standard and Universal Racks with 3" D (80 mm) Equipment Mounting Channels, Steel, Glacier White.
- x. Part Number 12408-E24, Rack-To-Runway Mounting Plate, For 20" W (510 mm) and 24" W (610 mm) Cable Runway (Ladder Rack), for Standard and Universal Racks with 3" D (80 mm) Equipment.
- y. Mounting Channels, Aluminum, Glacier White.
- z. Rack-To-Runway Mounting Plate attaches cable runway to the top of Two-post freestanding racks in parallel or perpendicular orientation. Includes J-bolt installation hardware for 1-1/2"H (38 mm) cable runway and rack top angles. CPI recommends use with Cable Runway Elevation Kit.
- aa. Part Number 12121-E09, Rack-To-Runway Mounting Plate, for 5" W to 9" W (130 mm to 230 mm) Cable Runway (Ladder Rack), For Standard Rack with 3" D (150 mm) Equipment Mounting Channels, Steel, Glacier White.
- bb. Part Number 12121-E12, Rack-To-Runway Mounting Plate, for 9" W to 12" W (230 mm to 300 mm) Cable Runway (Ladder Rack), for Standard Rack with 3" D (150 mm) Equipment Mounting Channels, Steel, Glacier White.
- cc. Part Number 12121-E18, Rack-To-Runway Mounting Plate, for 15" W to 18" W (380 mm to 460 mm) Cable Runway (Ladder Rack), for Standard Rack with 3" D (150 mm) Equipment Mounting Channels, Steel, Glacier White.



- dd. Part Number 12409-E24, Rack-To-Runway Mounting Plate, for 20" W (510 mm) and 24" W (610 mm) Cable Runway (Ladder Rack), for Standard Rack with 3" D (150 mm) Equipment Mounting Channels, Aluminum, Glacier White.
- ee. Rack-To-Runway Mounting Plate attaches cable runway to the top of 2-post freestanding racks in parallel or perpendicular orientation. Includes J-bolt installation hardware for 1-1/2" (38 mm) high cable runway and rack top angles. CPI recommends use with Cable Runway Elevation Kit.
- ff. Part Number 10506-E02, Cable Runway Elevation Kit, 2"H (50 mm), 2-1/2"H (64 mm) or 3"H (80 mm), for Racks, Steel, Glacier White.
- gg. Part Number 10506-E06, Cable Runway Elevation Kit, 4"H (100 mm), 5"H (130 mm) or 6"H (150 mm), for Racks, Steel, Glacier White.
- hh. Part Number 10506-E12, Cable Runway Elevation Kit, 2"H (50 mm), 2-1/2"H (64 mm) or 3"H (80 mm), for Cabinets, Steel, Glacier White.
- ii. Part Number 10506-E16, Cable Runway Elevation Kit, 4"H (100 mm), 5"H (130 mm) or 6"H (150 mm), for Cabinets, Steel, Glacier White.
- jj. Cable Runway Elevation Kit are L-shaped supports that elevate cable runway 2" (50 mm), 2-1/2" (64 mm), 3" (80 mm) or 4" (100 mm), 5" (130 mm), 6" (150 mm) above the rack or cabinet. May also be used to support cable runway vertically against a wall with a standoff from the wall. Kits for racks must be used with a Rack-To-Runway Mounting Plate. Includes installation hardware for Rack-to-Runway Mounting Plates and Cabinets. Order installation hardware for wall separately.
- kk. Part Number 10608-E01, Vertical Wall Brackets, 1 pair, Steel, Glacier White.
- ll. Attach cable runway to the wall or floor with no standoff. 1/4" or M6 installation hardware not included.

M. Tool-less Pathway Dividers

- 1. Tool-less Pathway Dividers shall be made from 6.8"H x 1.5" W x 2.2" D (173 mm x 38 mm x 55.9 mm) Polycarbonate/Acrylonitrile Butadiene Styrene (PC/ABS) thermoplastic material.
- 2. Universal design of the Tool-less Pathway Divider shall be compatible with other runway cross member shapes and dimensions:
  - a. .375"H x 1.50" D (9 mm x 38 mm) Universal Cross Member (all depths)
  - b. .50"H x 1" D (13 mm x 25 mm) Telco Cross Member (all depths)
  - c. .50"H x 1" D (13 mm x 25 mm) UL Cross Member (all depths)
- 3. Dividers shall include a two-piece hinged assembly and a tool-less snap ring which secures the divider into a closed position.
- 4. Tool-less Pathway Dividers will be available in packs of 10 and 100.



5. Tool-less Cross Member Radius Drops

- a. Tool-less Cross Member Radius Drops shall be manufactured from .060" (1.5 mm) thick Steel and measure 4.6"H x 6.1" D (117 mm x 155 mm). Radius Drop will be curved with a 3" (76.2 mm) radius to allow a smooth vertical-to-horizontal transition. Cable tie-slots will be located on approximate 2" (50.8 mm) increments on the lower curved section of the Cross Member.
- b. The Width of the Tool-less Cross Member Radius Drop shall vary dependent upon the width of the Adjustable Cable Runway and Cross Members.
- c. Cable Spools are located at the top section of the Tool-less Cross Member Radius Drop and vary in number depending on the width of the Cross Member. Cable Spools are plastic, 1.6"H (40.6 mm) and taper from .81" (20.5 mm) to 1" (25 mm) in diameter.

6. Tool-less Stringer Radius Drops

- a. Tool-less Stringer Radius Drops shall be manufactured from .060" (1.5 mm) thick steel and measure 4.6"H x 4.6" D (117 mm x 117 mm). Radius Drops will be curved with a 3" (76.2 mm) radius to allow a smooth vertical-to-horizontal transition. Cable tie-slots will be located on approximate 1.5" (38.1 mm) increments on the lower curved section of the Cross Member.
- b. The Width of the Tool-less Stringer Radius Drop will vary dependent upon the width of the Adjustable Cable Runway and Cross Members.
- c. Cable Spools are located at the top section of the Tool-less Stringer Radius Drop and vary in number depending on the width of the Cross Member. Cable Spools are plastic, 1.6"H (40.6 mm) and taper from .81" (20.5 mm) to 1" (25 mm) in diameter.

7. Additional Accessories

- a. Cable straps used for attaching cable bundles to the Adjustable Cable Runway and accessories must be reusable with a hook and loop-style closure, at least 3/4" W (19 mm) and sized for cable bundles that are 2" (50 mm), 3" (80 mm) or 4" (100 mm) in diameter.
- b. End caps used to cover the ends of ladder rack will be manufactured from a black, fire-retardant, rubberized material. End caps will be sized for 1-1/2"H x 3/8" W (38 mm x 9 mm) side stingers and will be sold in pairs.
- c. Touch-up paint used on ladder rack and ladder rack system components will be color-matched to the finish on the ladder rack or component. Spray-on and bottled paint options will be available.
- d. Unless otherwise noted, finish on all metal components shall be epoxy-polyester hybrid powder coat (paint) in the color(s) specified below. Hardware will be zinc plated with a gold chem. finish.

8. Design Make:  
Chatsworth Products (CPI),  
Cable Runway Accessories:
- a. Part Number 14308-001, Tool-less Pathway Dividers, 6"H (152 mm), 10 Pack, Black.
  - b. Part Number 14308-002, Tool-less Pathway Dividers, 6"H (152 mm), 100 Pack, Black.
  - c. Part Number 14304-E09, Tool-less Cross Member Radius Drop, Runway, 9"W (229 mm), Glacier White.
  - d. Part Number 14304-E12, Tool-less Cross Member Radius Drop, Runway, 12"W (305 mm), Glacier White.
  - e. Part Number 14304-E15, Tool-less Cross Member Radius Drop, Runway, 15"W (381 mm), Glacier White.
  - f. Part Number 14304-E18, Tool-less Cross Member Radius Drop, Runway, 18"W (457 mm), Glacier White.
  - g. Part Number 14304-E24, Tool-less Cross Member Radius Drop, Runway, 24"W (610 mm), Glacier White.
  - h. Part Number 14304-E30, Tool-less Cross Member Radius Drop, Runway, 30"W (762 mm), Glacier White.
  - i. Part Number 14304-E36, Tool-less Cross Member Radius Drop, Runway, 36"W (914 mm), Glacier White.
  - j. Part Number 02006-203, Saf-T-Grip Reusable Cable Management Straps, Open Loop Series, 3/4"W x 6" L (19 mm x 150 mm) for 2" (50 mm) Diameter Cable Bundles, Package of 25, Royal Blue.
  - k. Part Number 14305-E00, Tool-less Stringer Radius Drop, Runway, Large, 10.5"W (268 mm), Glacier White.
  - l. Part Number 14305-E01, Tool-less Stringer Radius Drop, Runway, Small, 5.5"W (140 mm), Glacier White.
  - m. Part Number 02009-203, Saf-T-Grip Reusable Cable Management Straps, Open Loop Series, 3/4" W x 9" L (19 mm x 230 mm) for 3" (80 mm) Diameter Cable Bundles, Package of 25, Royal Blue.
  - n. Part Number 02012-203, Saf-T-Grip Reusable Cable Management Straps, Open Loop Series, 3/4" W x 12" L (19 mm x 300 mm) for 4" (100 mm) Diameter Cable Bundles, Package of 25, Royal Blue.
  - o. Part Number 05006-203, Saf-T-Grip Reusable Cable Management Straps, End Grommet & Buckle Series, 3/4" W x 6" L (19 mm x 150 mm) for 2" (50 mm) Diameter Cable Bundles, Package of 25, Royal Blue.
  - p. Part Number 05009-203, Saf-T-Grip Reusable Cable Management Straps, End Grommet & Buckle Series, 3/4" W x 9" L (19 mm x 230 mm) for 3" (80 mm) Diameter Cable Bundles, Package of 25, Royal Blue.
  - q. Part Number 05012-203, Saf-T-Grip Reusable Cable Management Straps, End Grommet & Buckle Series, 3/4" W x 12" L (19 mm x 300 mm) for 4" (100 mm) Diameter Cable Bundles, Package of 25, Royal Blue.
  - r. Part Number 10596-E08, Cable Retaining Post, 8"H (200 mm), Glacier White.
  - s. Part Number 10642-001, Cable Runway Protective End Caps, 1 Pair, Black.

- t. Part Number 25400-700, Touch-Up Paint in Spray Can, Black. Paint in spray cans cannot be shipped by air.
- u. Part Number 25401-100, Touch-Up Paint in 1oz. Bottle, Gray.
- v. Part Number 25401-200, Touch-Up Paint in 1oz. Bottle, Computer Beige.
- w. Part Number 25401-700, Touch-Up Paint in 1oz. Bottle, Black.
- x. Part Number 25401-E00, Touch-Up Paint in 1oz. Bottle, Glacier White.

9. Miscellaneous Hardware

Design Make:  
Chatsworth Products (CPI),  
Miscellaneous Hardware:

- a. Part Number 11408-001, Cable Runway Support Bracket, for 3/8" or M10 drop rod and 1-1/2"H (38 mm) Cable Runway, Gold.
- b. Part Number 11408-003, Cable Runway Support Bracket, for 5/8" or M16 drop rod and 1-1/2"H (38 mm) Cable Runway, Gold.
- c. Part Number 11406-001, Ceiling Support Bracket, for 3/8" or M10 drop rod, Gold.
- d. Part Number 11406-002, Ceiling Support Bracket, for 5/8" or M16 drop rod, Gold.
- e. Part Number 10607-002, Cable Runway Slotted Support Bracket, for 3/8" or M10 drop rod and 1-1/2"H (38 mm) Cable Runway, Gold.
- f. Part Number 10607-001, Cable Runway Slotted Support Bracket, for 5/8" or M16 drop rod and 1-1/2"H (38 mm) Cable Runway, Gold.
- g. Part Number 10873-001, Slip-On Cable Runway Support Bracket, for 5/8" drop rod, Gold.
- h. Part Number 03003-001, Slip-On Lock Nut, for 3/8-16 UNC-2A rod, Zinc plated.
- i. Part Number 03003-002, Slip-On Lock Nut, for 5/8-11 UNC-2A rod, Zinc plated.
- j. Part Number 20142-071, Hex Nut, 1/4-20, Gold.
- k. Part Number 20142-081, Hex Nut, 5/16-18, Gold.
- l. Part Number 20142-091, Hex Nut, 3/8-16, Gold.
- m. Part Number 03001-001, Hex Nut, 1/2-13, Gold.
- n. Part Number 20142-111, Hex Nut, 5/8-11, Gold.
- o. Part Number 04003-002, Split Lock Washer, 1/4, Gold.
- p. Part Number 20141-080, Split Lock Washer, 5/16, Gold.
- q. Part Number 20142-090, Split Lock Washer, 3/8, Gold.
- r. Part Number 20141-100, Split Lock Washer, 1/2, Gold.
- s. Part Number 04003-001, Split Lock Washer, 5/8, Gold.
- t. Part Number 04002-002, Washer, Type A Plain, 3/8, Gold.
- u. Part Number 04002-001, Washer, Type A Plain, 5/8, Gold.
- v. Part Number 02007-004, Hex Lag Screw, 1/4-10 x 2" L, Gold.
- w. Part Number 02006-001, Hex Lag Screw, 1/2-6 x 2" L, Gold.
- x. Part Number 20098-832, Hex Lag Screw, 3/8-7 x 2" L, Gold.
- y. Part Number 02006-002, Hex Lag Screw, 5/8-5 x 2" L, Gold.
- z. Part Number 20067-001, Anchor, 3/8-16 x Expansion Shield, Zinc.
- aa. Part Number 06001-004, Anchor, 5/8-11 Multi-set, Zinc.
- bb. Part Number 06003-001, Anchor Setting Tool, for P/N 06001-004.

## PART 3 – EXECUTION

### 3.1 GENERAL

- A. Refer to Section 270000 for additional requirements.
- B. Power Distribution Units (PDU's)
  - 1. Provide and install two rack mount PDU's per equipment rack installed.
  - 2. Coordinate PDU model type with the input specifications of the power being supplied to the equipment racks in the telecommunication spaces.
- C. Relay Racks (Equipment Racks)
  - 1. Provide and assemble relay racks according to manufacturer's instructions. Verify that equipment mounting rails are sized properly for rack-mount equipment before attaching the rack to the floor.
  - 2. All racks must be attached to the floor in four places using appropriate floor mounting anchors. When placed over a raised floor, threaded rods should pass through the raised floor tile and be secured in the structural floor below. (Use CPI Part Number 40604-003 for concrete slab floors or 40607-001 for wood floors. Raised floor support kits are also available.)
  - 3. Racks shall be grounded to the TGB using appropriate hardware provided by the contractor. The ground will meet local code requirements and will be approved by the Authority Having Jurisdiction (AHJ).
  - 4. Ladder rack may be attached to the top of the rack to deliver cables to the rack. The rack shall not be drilled to attach ladder rack. Use appropriate hardware from the ladder rack manufacturer.
- D. Vertical Cable Managers
  - 1. Provide and install vertical wire management on each end of the equipment rack systems and in between each set of racks. 10-inch-wide vertical management shall be used on the end of the rack system, where no further racks could be installed. 12-inch-wide vertical management shall be used in between all racks and on any end where a future rack is possible.
  - 2. Attach vertical cable managers to the side of the rack/frame using the manufacturer's installation instructions and included hardware.
  - 3. When a single vertical cable manager is used in between two racks/frames, attach the vertical cable manager to both racks/frames.
  - 4. When more than one cable manager is used on a rack/frame or group of racks/frames, use the same make, style and size of vertical cable manager on the rack/frame or in between racks/frames.
  - 5. The color of the rack(s)/frame(s) and cable manager(s) must match.
  - 6. Doors shall be attached to the cable manager and in the closed position after cabling is complete.

E. Horizontal Cable Managers

1. Provide two (4), 4u tall horizontal cable managers per equipment rack.
2. Coordinate mounting location of each horizontal cable management, with the Owner's Telecommunications Representative.
3. Attach horizontal cable managers to the rack/frame with four screws according to the manufacturer's installation instructions. Each cable manager shall be centered within the allocated rack-mount space (U).
4. Horizontal managers shall be located so that the number of ports (cables) that each manager supports shall not exceed each cable manager's cable fill capacity.
5. Covers shall be attached to the cable manager and in the closed position after cabling is complete.

F. Ladder Rack

1. Provide and install all components of the ladder rack system (ladder rack, turns, splices, supports, and accessories) from a single manufacturer.
2. Ladder rack shall be installed with side stringers facing down so that the ladder forms an inverted U-shape and so that welds between the stringers (sides) and cross members (middle) face away from cables.
3. Ladder rack shall be secured to the structural ceiling, building truss system, wall, floor or the tops of equipment racks and/or cabinets using the manufacturer's recommended supports and appropriate installation hardware and methods as defined by local code or the authority having jurisdiction (AHJ).
4. Ladder rack splices will be made in mid-span, not over a support, with the manufacturer's recommended splice hardware.
5. Ladder rack shall be supported every 5' (1.5 m) or less in accordance with TIA-569-B. Ladder rack shall be supported within 2' (0.6 m) of every splice and within 2' (0.6 m) on both/all sides of every intersection. Support ladder rack within 2' (0.6 m) on both sides of every change in elevation. Support ladder rack every 2' (0.6 m) when attached vertically to a wall.
6. Heavy-duty splices are required for 18" (460 mm) wide or wider ladder rack. Heavy-duty splices are required for any splice formed in the vertical orientation including changes in elevation formed using vertical-to-horizontal 90° turns or horizontal-to-vertical 90° turns. Use heavy-duty splices to secure all overhead turns to the overhead horizontal pathway(s).
7. When the pathway is overhead, ladder rack shall be installed with a minimum clearance of 12" (300 mm) above the ladder rack. Leave a minimum of 12" (300 mm) in between ladder rack and ceiling/building truss structure. Leave a minimum of 3" (75 mm) in between ladder rack and the tops of equipment racks and/or cabinets. Multiple tiers of ladder rack shall be installed with a minimum clearance of 12" (300 mm) in between each tier of ladder rack. When located above an acoustical drop ceiling, leave a minimum of 3" (75 mm) clearance between the top of the drop ceiling tiles and the bottom of the ladder rack.
8. When installed under a raised floor, ladder rack shall be installed with a minimum 3" (75 mm) clearance between the top of the ladder rack and the bottom of the floor tiles or floor system stringers, whichever is lower in elevation. Maintain a 3" (75 mm) clearance between ladder racks wherever ladder racks cross.

9. Within each telecommunications room, ladder rack should be bonded together, electrically continuous, and bonded to the TGB, unless noted otherwise in the specifications and contract documents. Ladder rack and turns shall be bonded across each splice with a bonding kit or with splices per the manufacturer's installation instructions. Ladder rack shall be bonded to the Telecommunications Grounding Busbar (TGB) using an approved ground lug on the ladder rack and a minimum #6 grounding. Remove paint from the ladder rack where bonding/ground lugs or splices contact the ladder rack so that the lug or splice will contact bare metal. Use antioxidant joint compound in between the bare metal on the ladder rack and ground lug or splice. Use antioxidant joint compound in between the bus bar and the ground lug. Verify continuity through the bonds at splices and intersections between individual ladder rack sections and turns and through the bond to the TGB.
10. The quantity of cables within the ladder rack will not exceed a whole number value equal to 50% of the interior area of the ladder rack divided by the cross-sectional area of the cable. The interior area of ladder rack will be considered to be the width of the ladder rack multiplied by a height of 2" (50 mm), unless cable retaining posts are added to the ladder rack. The interior area of ladder rack equipped with cable retaining posts will be considered to be the width of the ladder rack multiplied by a height of 6" (150 mm). Actual cable fill for ladder rack that is not equipped with cable retaining posts will not exceed 2" (50 mm) in height. Actual cable fill for ladder rack equipped with cable retaining posts will not exceed 6" (150 mm) in height.
11. The combined weight of cables within the ladder rack will not exceed the stated load capacity of the ladder rack as stated in the manufacturer's product specifications or load/design tables.
12. Cables (cable bundles) will be secured to the cross members of ladder rack with 3/4" (19 mm) wide reusable straps. Straps are not required when ladder rack is equipped with cable retaining posts.
13. Add 8" (200 mm) high cable retaining posts to the open sides of ladder rack when cable fill exceeds 2" (50 mm) in height or when cable bundles cannot be secured directly to the ladder rack cross members with a strap. Cable fill within any ladder rack should not exceed 6" (150 mm) in height.
14. When a single ladder rack supports different types of cable media, the cable media will be separated within the pathway by cable spools that attach to the cross members on the ladder rack. Treat each type of cable media and divided area of the ladder rack separately when determining cable fill limits.
15. Use a radius drop to guide cables wherever cable exits overhead ladder rack to access a rack, frame, cabinet or wall-mounted rack, cabinet or termination field. If necessary, provide a moveable cross member also to attach and align the radius drop in between the welded cross members of a ladder rack.



16. Cover the exposed ends of cable runway that do not terminate against a wall, the floor or the ceiling with end caps or an end closing kit.
17. Use auxiliary support brackets that attach to the side stringer of the ladder rack to support interconnect cabling (patch cords, equipment cords, jumper cords) that is routed between racks using the ladder rack. Auxiliary support brackets can be used to support other conductors that should be physically separated from cables within the ladder rack as defined by local code or the authority having jurisdiction (AHJ).
18. Whenever possible, maintain a 2' (0.6 m) separation between ladder rack used for communications cables and pathways for other utilities or building services.
19. The installer will provide touch-up paint color-matched to the finish on the ladder rack and will correct any minor cosmetic damage (chips, small scratches, etc.) resulting from normal handling during the installation process prior to delivery to the owner. If a component is cosmetically damaged to the extent that correction in the field is obvious against the factory finish, the component will be replaced with a new component finished from the factory. If a component is physically damaged due to mishandling or modification during the installation process, it shall not be used as part of the ladder rack system.

G. Adjustable Cable Runway

1. Provide and install all components of the Adjustable Cable Runway and other CPI Runway Family components. The Adjustable Cable Runway (14300 –XXX) or combinations of Cross Member Kits (14302 –XXX) and Stringer Kits (14303 –XXX), as well as turns, splices, supports and accessories from a single manufacturer.
2. The Adjustable Cable Runway shall be installed with side Stringers facing down so that the runway forms an inverted U-shape and so that hardware between the Stringers (sides) and Cross Members (middle) face away from cables.
3. The Adjustable Cable Runway shall be secured to the structural ceiling, building truss system, wall, floor or the tops of equipment racks and/or cabinets using the manufacturer's recommended supports and appropriate hardware, as defined by local code or the authority having jurisdiction (AHJ).
4. The Adjustable Cable Runway shall be supported every 5' (1.5 m) or less in accordance with TIA-569-B. Ladder rack shall be supported within 2' (0.6 m) of every splice and within 2' (0.6 m) on both/all sides of every intersection. Support Adjustable Cable Runway within 2' (0.6 m) on both sides of every change in elevation. Support the Adjustable Cable Runway every 2' (0.6 m) when attached vertically to a wall.
5. Secure the Adjustable Cable Runway to each support with included hardware so that at minimum the Adjustable Cable Runway is connected to each support by two fasteners.
6. Adjustable Cable Runway splices shall be made in mid-span, not over a support, with the manufacturer's recommended splice hardware.

7. When the pathway is overhead, ladder rack shall be installed with a minimum clearance of 12" (300 mm) above the ladder rack. Leave a minimum of 12" (300 mm) in between Adjustable Cable Runway and ceiling/building truss structure. Leave a minimum of 3" (75 mm) in between the Adjustable Cable Runway and the tops of equipment racks and/or cabinets. Multiple tiers of Adjustable Cable Runway shall be installed with a minimum clearance of 12" (300 mm) in between the Adjustable Cable Runway. When located above an acoustical drop ceiling, ladder rack shall be installed a minimum of 3" (75 mm) above the drop ceiling tiles.
8. When installed under a raised floor, the Adjustable Cable Runway shall be installed with a minimum 3" (75 mm) clearance between the top of the Adjustable Cable Runway and the bottom of the floor tiles or floor system Stringers, whichever is lower in elevation. Maintain a 3" (75 mm) clearance between cable runways wherever Adjustable Cable Runways cross.
9. Within each telecommunications room, cable runway should be bonded together, electrically continuous, and bonded to the Telecommunications Grounding Busbar (TGB), unless otherwise noted in the specifications and contract documents. Ladder rack and turns shall be bonded across each splice with a UL Classified Splice Kit or other accepted method as recommended by the AHJ. Cable runway shall be bonded to the TGB using an approved ground lug on Adjustable Cable Runway and a minimum #6 grounding wire or as recommended by the AHJ. Verify the bonds at splices and intersections between individual Adjustable Cable Runway sections and turns, as well as the TBB.
10. Thread-forming screws will cut through paint in order to create a bond between the Runway Cross Member and the Stringer.
11. When cable fill exceeds 2" (50 mm) in height or when cable bundles cannot be secured directly to the ladder rack Cross Members with a strap, add 8"H (200 mm) cable retaining posts or 6"H (150 mm) pathway dividers to the open sides of the ladder rack. Cable fill within any runway should not exceed 6" (150 mm) in height.
12. The quantity of cables within the Adjustable Cable Runway will not exceed a whole number value equal to 50% of the interior area of the ladder rack, divided by the cross-sectional area of the cable. The interior area of ladder rack will be considered to be the width of the ladder rack multiplied by a height of 2" (50 mm), unless cable retaining posts/pathway dividers are added to the runway. The interior area of ladder rack equipped with cable retaining posts/pathway dividers will be considered to be the width of the ladder rack multiplied by a height of 6" (150 mm). Actual cable fill for ladder rack that is not equipped with cable retaining posts/pathway dividers will not exceed 2" (50 mm) in height. Actual cable fill for ladder rack equipped with cable retaining posts/pathway dividers will not exceed 6" (150 mm) in height.
13. The combined weight of cables within the Adjustable Cable Runway will not exceed the stated load capacity of the ladder rack as stated in the manufacturer's product specifications or design tables.
14. Cables (cable bundles) will be secured to the Cross Members of Adjustable Cable Runway with  $\frac{3}{4}$ " W (19 mm) reusable straps. Straps are not required when ladder rack is equipped with cable retaining posts/pathway dividers.



15. Cover the exposed ends of the Adjustable Cable Runway that do not terminate against a wall, the floor or the ceiling with fire-retardant black colored end caps made from a rubberized material or an end closing kit consisting of a flat bar of ladder rack stringer material factory cut to the width of the ladder rack and secured to the ladder rack with a junction splice kit.
16. Separate different cable media types within the runway using pathway dividers. Treat each type of cable media separately when determining cable fill limits.
17. Where cable exits or enters the end, middle or side of overhead Adjustable Cable Runway to access a rack, frame, cabinet or wall-mounted rack, cabinet or termination field, a radius drop shall be used to guide the cable.
18. Maintain a minimum separation of 2' (0.6 m) between Adjustable Cable Runway used for communications cables and pathways for other utilities or building services.
19. The installer will provide touch-up paint color-matched to the finish on the component and will correct any minor cosmetic damage (chips, small scratches, etc.) resulting from normal handling during the installation process prior to delivery to the owner. If a component is cosmetically damaged to the extent that correction in the field is obvious against the factory finish, the component will be replaced with a new component finished from the factory. If a component is physically damaged due to mishandling or modification during the installation process, it shall not be used as part of the Adjustable Cable Runway system.

END OF SECTION 271100

## SECTION 271500 - COMMUNICATIONS HORIZONTAL CABLING

### PART 1 – GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 01 Specification Sections, and 270000 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. General:

- 1. Refer to Section 270000 for General Requirements.

- B. Intent:

- 1. The contractor shall provide a complete category 6a U/UTP (unshielded) structured cabling, capable of performing at 10 gigabit speeds at distance up to 100 meters.
  - 2. The contractor shall provide a structured cabling system with a Manufacturer's Warranty and Application Assurance for a minimum of 20 years.

- C. Contractor shall provide all horizontal cabling, terminating hardware, adapters, and cross-connecting hardware necessary to create a complete functional system.

- D. Section Includes:

- 1. Category 6a U/UTP Cable
  - 2. Category 6a Shielded Patch Panels
  - 3. Category 6a Unshielded Modular Jacks
  - 4. Category 6a Unshielded, Field Terminable, Modular Plugs
  - 5. Angular Modular Faceplates
  - 6. Category 6a Unshielded Cable Assemblies (Patch and Equipment Cords)
  - 7. Consolidation Points
  - 8. Entrance protection equipment

#### 1.3 REFERENCES

- A. Definitions:

- 1. Refer to Section 270000 for General Requirements.

B. Reference Standards:

1. Refer to Section 270000 for General Requirements.

1.4 ADMINISTRATIVE REQUIREMENTS

A. General:

1. Refer to other sections within Division 27 for additional requirements.

B. Coordination:

1. Coordinate the color of the faceplates with Architect.
2. Coordinate the faceplate material with the Architect.
3. Coordinate labeling scheme with owner's telecommunications representative to adhere to the university's labeling standard.
4. Coordinate the mounting method and exact location for each wireless access point and security camera, with the architect and owner's telecommunication representative, prior to installing, and before a ceiling is made inaccessible.
5. Coordinate the design, exact product usage and installation of any consolidation points with the owner's telecommunications representative.

C. Pre-installation Meetings:

1. Contractor's RCDD and installation supervisor to meet with owner's telecommunication representative before pulling cable with the intent of coordinating details.

D. Sequencing:

1. Provide all Category 6a Shielded Cable Assemblies upon completion of horizontal cable testing.

E. Submittals:

1. Details of the Manufacturer's Warranty and Application Assurance program.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

A. General:

1. Refer to other sections within Division 27 for additional requirements.

B. Samples:

1. Telecommunication outlet connectors, jack assemblies, housings and faceplates for color selection and evaluation of technical specifications and requirements.
2. Provide sample faceplates of each color to facilitate color choice.

C. Test and Evaluation Reports:

1. The contractor's RCDD must submit for review a draft test plan of all proposed cabling and equipment being installed under this project. Upon the draft's approval, the contractor's RCDD must approve and stamp the finalized test plan before submitting.

D. Manufacturer Reports:

1. Each spool of cable's report test report from the manufacturer

E. Qualification Statements:

1. Qualification of the installers to provide warranty.

1.6 CLOSEOUT SUBMITTALS

A. General:

1. Refer to other sections within Division 27 for additional requirements.

B. Maintenance Contracts

C. Operation and Maintenance Data: Refer to section 27 00 00 for general requirements.

D. Warranty Documentation: Refer to section 27 00 00 for general requirements.

E. Test Reports:

1. The contractor's RCDD must approve and stamp submit the test reports for all fiber and copper cabling prior to submitting.

1.7 MAINTENANCE SUBMITTALS

A. Extra Stock Material

1. The Contractor will provide the following products, matching the products used on this project, to the Owner's Telecommunication Representative:

a. Category 6a Unshielded Cable Assemblies

- 1) For each equipment rack installed:

- a) 3 foot: Qty: 80
- b) 5 foot: Qty: 80
- c) 7 foot: Qty: 150
- d) 15 foot: Qty: 150

2) Tools

- a) Jack and Plug Manufacturer —4 of each, manufacture-specific, termination tools for installing their modular plugs and jacks.

1.8 QUALITY ASSURANCE

A. General

- 1. Refer to other sections within Division 27 for additional requirements.

B Manufacturer's Warranty and Application Assurance

- 1. The Structured Connectivity Solutions Extended Manufacturer's Warranty and Application Assurance

- a. The extended manufacturer's warranty, for a minimum of 20 years from the date of occupancy, shall include providing replacement or repair of defective product(s) and labor for the replacement or repair of such defective product(s) for the period indicated above.
- b. Minimum twenty (20) year application assurance: The application assurance shall cover the failure of the wiring system to support the application which it was designed to support, as well as additional application(s) introduced in the future for a minimum twenty (20) year period.
- c. System certification: Upon successful completion of the installation and subsequent inspection, the Owner shall be provided with a numbered certificate, from the manufacturer(s), registering the installation.

2. Extended Product Warranty

- a. The Extended Product Warranty covers all passive Registered Manufacturer SCS components (i.e., cable and connectivity components that make up the passive data and telecommunications signal transmission infrastructure). "Passive Components" are defined as Manufacturer SCS components that exhibit no gain or contribute no energy. Manufacturer Solutions warrants, from the occupancy date, provided a registration certificate is issued by the Manufacturer Solutions to the customer, the following:
  - 1) that the Passive Components of Registered Manufacturer SCS will be free from manufacturing defects in material and workmanship under normal and proper use;
  - 2) that all Manufacturer Solutions Passive Components in the Registered Manufacturer SCS meet or exceed the relevant component specification of the TIA 568-C series and ISO/IEC 11801: 2002 standards;
  - 3) that the Registered Manufacturer SCS compliant links/channels will meet or exceed the applicable requirements of the TIA 568-B series, and ISO/IEC 11801: 2002 standards for cabling links/channel configurations specified in these standards;

- 4) that the Registered Manufacturer SCS compliant channels will additionally meet or exceed the Guaranteed Published Channel Performance in the Manufacturer SCS Performance Specifications Addendum in effect at the time of installation.
  - b. Under the Extended Product Warranty, Manufacturer Solutions will (or will authorize a Manufacturer Business Partner to) either repair or replace the defective Registered Manufacturer SCS product at Manufacturer Solution's cost. Manufacturer Solutions will pay a Manufacturer Business Partner for the cost of labor to repair or replace any such defective product on behalf of Manufacturer Solutions, provided, that such repair or replacement and associated labor costs receive the prior written approval of Manufacturer Solutions. If Manufacturer Solutions chooses to repair products, Manufacturer Solutions will use new replacement parts. If Manufacturer Solutions chooses to replace products, Manufacturer Solutions may replace such products with new products of the same or similar design. Any such repair or replacement will be warranted for either:
    - 1) 90 days or
    - 2) The remainder of the original warranty period, whichever is longer.
3. Application Assurance:
  - a. The Application Assurance covers the Registered Manufacturer SCS compliant to support operations of the application(s) that the system was designed to support, as well as additional application(s) defined below. Manufacturer Solutions warrants that the Registered Manufacturer SCS will be free from defects that prevent operation of the specific application(s) for which the Registered Manufacturer SCS was initially designed as long as the design is in compliance with the Manufacturer SCS Performance Specifications for said applications and is in compliance with all other terms and conditions of this warranty.
  - b. The Application Assurance also covers the following additional applications:
    - 1) those as specified in the current (at the time of installation) Manufacturer SCS Performance Specifications and Addendums; and
    - 2) in accordance with application standards specifications, any application introduced in the future by recognized standards or user forums that use the relevant TIA 568-C series or ISO/IEC 11801 components and link/channel specifications for cabling, to the extent that such applications are defined to operate over the guaranteed channel performance and/or the installed channel topologies.
4. Term of Warranty
  - a. The warranty period will be for a minimum of Twenty (20) years from the date of occupancy.
  - b. Moves, additions, or changes are covered by the original registration certificate if performed by a Manufacturer Business Partner in compliance with the Manufacturer SCS design, installation and registration requirements.
  - c. Administration of Manufacturer SCS cords by the end user is covered by the original registration certificate.

5. Person / Entity Covered

- a. This warranty is for the sole benefit of the person or entity to whom the Manufacturer Solution's registration certificate is issued and any successor in interest to the site in which such Registered Manufacturer SCS was originally installed.

C. Qualifications

1. Demonstrate that they have successfully installed these systems, utilizing their standard products, for a period of five (5) years.
2. Employ service technicians who are trained in accordance with the systems manufacturer's recommendations.
3. Own and demonstrate proficiency in the use of the required test equipment, tools, etc. for the proper installation, set-up, testing and maintenance of the system. If requested must provide a listing of tools and/or equipment and where appropriate, certifications in the proper training and use of the tools and/or equipment.

D. Installers

1. Copper and fiber cable installation shall be under the direct supervision of a certified, BICSI Level 2 Installer, who shall be present at all times when work of this section is performed at project site.
2. All members of the installation team shall be certified, by the manufacturer providing the Manufacturer's Warranty and Application Assurance, as having completed the necessary training to complete their part of the installation and are capable of performing an installation that falls under manufacturer's guidelines necessary for the owner to obtain the Manufacturer's Warranty and Application Assurance.

E. Testing Agencies: Refer to section 270000 for General Requirements.

F. Certifications: Refer to section 270000 for General Requirements.

PART 2 – PRODUCTS

2.1 GENERAL

- A. In order to receive the Manufacturer's Warranty and Application Assurance, all products used in the horizontal cabling shall be specifically matched together, as specified below.
- B. Refer to other sections within Division 27 for additional requirements.

2.2 CATEGORY 6A U/UTP CABLE

- A. Shall be from only one manufacturer.
- B. Shall be plenum rated

- C. Conductors shall be 23 AWG bare copper
- D. Shall be one of these, owner-approved, products:
  - 1. Panduit, Category 6a GenSpeed 10 MTP UTP 4-Pair Cable
    - a. General Cable Part Number: 7151849
  - 2. Leviton, SST Category 6a UTP 4-Pair Cable
    - a. Leviton Part Number: 11101842
  - 3. Commscope, ETL Verified Category 6a U/UTP 4-Pair Cable
    - a. Commscope Part Number: UN874047904/10

### 2.3 CATEGORY 6A SHIELDED AND ANGLED PATCH PANELS

- A. Shall be based on and matched to the manufacturer of the category 6a F/UTP cable, as follows:
  - 1. Panduit Category 6a UTP:
    - a. Mini-Com Angled Patch Panel, 48 Port, 2 RU, Black
    - b. Panduit Part Number: CPA48BLY
  - 2. Leviton category 6a UTP:
    - a. Atlas-X1 UTP Quickport Jacks, Blue
      - 1) Leviton Part Number: 6AUJK-RL6
  - 3. Commscope Category 6a UTP:
    - a. Angled Discrete Distribution Module Panel, SL, UTP, 2U, 48 Port
      - 1) Commscope Part Number: 760241141/USL10G-BLU



## 2.4 CATEGORY 6A MODULAR JACKS

A. Shall be based on and matched to the manufacturer of the category 6a F/UTP cable, as follows:

1. Panduit Category 6a UTP:
  - a. Mini-Com TX6a 10Gig UTP Jack Modules with MaTriX Technology, Blue
    - 1) Panduit Part Number: CJ6X88TGBU
      - a) Panduit Part Number: Up/Down 45 degree CJUD6X88TGBU
      - b) Panduit Part Number: Left/Right 45 degree CJLR6X88TGBU
2. Leviton Category 6a UTP:
  - a. Atlas-X1 UTP Quickport Jacks, Blue
    - 1) Leviton Part Number: 6AUJK-RL6
3. Commscope Category 6a UTP:
  - a. Uniprise USL Series Modular Jack, RJ45, Cat6a, Blue
    - 1) Commscope Part Number: 760241141/USL1OG-BLU

## 2.5 MODULAR FACEPLATES

A. Shall be based on and matched to the manufacturer of the category 6a UTP cable, as follows:

1. Panduit Category 6a UTP/Sloped:
  - a. Mini-Com Executive Series Faceplates, Single Gang
    - 1) 2 Port Part Number: CFPSL2IWY
    - 2) 4 Port Part Number: CFPSL4IWY
    - 3) Blanking Module Part Number: CMBIW-X
2. Leviton Category 6a UTP:
  - a. Flat Single Gang QuickPort Wallplate with ID Windows
    - 1) 1 Port Part Number: 42080-1WS
    - 2) 2 Port Part Number: 42080-2WS
    - 3) 4 Port Part Number: 42080-4WS
    - 4) Blanking Module Part Number: 41084-BW

3. Commscope Category 6a UTP:

a. Faceplate Kit, Labelled, Single Gang

- 1) 1 Port Part Number: M11AS-246
- 2) 2 Port Part Number: M12AS-246
- 3) 4 Port Part Number: M14AS-246
- 4) Blanking Module Part Number: 1-1116412-3

2.6 CATEGORY 6A CABLE ASSEMBLIES

A. Shall be based on and matched to the manufacturer of the category 6a UTP Cable.

1. Panduit Category 6 a UTP:

a. TX6A 10 Gig UTP Patch Cords, Blue

- 1) 5 Foot: UTP6AX5BU
- 2) 7 Foot: UTP6AX7BU
- 3) 9 Foot: UTP6AX10BU
- 4) 15 Foot: UTP6AX15BU

2. Levington Category 6A UTP:

a. Category 6A Patch Cords

- 1) 5 Foot: 6AS10-05L
- 2) 7 Foot: 6AS10- 07L
- 3) 9 Foot: 6AS10-010L
- 4) 15 Foot: 6AS10-015L

3. Commscope Category 6a UTP:

a. Uniprise Ultra 10 Cat 6a U/UTP Snagless Patch Cord

- 1) 5 Foot: 0ZF005
- 2) 7 Foot: 0ZF007
- 3) 9 Foot: 0ZF010
- 4) 15 Foot: 0ZF015

2.7 ENTRANCE PROTECTION EQUIPMENT

A. For applications up to 75 volts

- a. Solid State, protects high-performance 4-pair CAT 6A Outside Plant Cables as well as CAT 6 A UTP cables for POE/Data applications (75V).

b. Design Make:

- 1) DITEK Surge Protection
- 2) Part Number: DTK-MRJPOES

2.8 PRODUCTS NOT SPECIFIED

- A. If, at no fault to the contractor, a product become no longer available, or a product is needed and not listed in the Product section of this document, the Contractor's RCDD shall seek, and submit proof of, approval from the manufacturer for use of such product, in the system. The owner's telecommunications representative must review and approve, in writing, use of any product not specified herein.

PART 3 – EXECUTION

3.1 GENERAL

- A. Refer to Section 270000 for additional requirements.

3.2 INSTALLERS

- A. Refer to Section 270000 for General Requirements.

3.3 EXAMINATIONS

- A. Verify the following before proceeding:
1. Conduits, cable trays and pull boxes are properly installed.
  2. Plywood backboards in communications rooms are properly.
  3. Grounding system is properly installed and tested.
  4. All backbone cabling service loops are installed and protected.

3.4 PREPARATIONS

- A. Refer to Section 27 00 00 for general requirements.

3.5 INSTALLATION

- A. Horizontal cables for wireless access points and security cameras.
1. Coordinate with the architect and owner's telecommunications representative before proceeding.
  2. Terminate all horizontal cables with a modular jack and in a box with a faceplate.

3. Label it following the labeling scheme defined for this project.

B. Consolidation Points

1. Coordinate with the owner's telecommunications representative before proceeding.

C. Work Area Outlets

1. Cables shall be coiled in the in-wall or surface-mount boxes if adequate space is present to house the cable coil without exceeding the manufacturers bend radius. No more than 12" of UTP slack shall be stored in an in-wall box, modular furniture raceway, or insulated walls. Excess slack shall be loosely configured and stored in the ceiling above each drop location when there is not enough space present in the outlet box to store slack cable.
2. Cables shall be dressed and terminated in accordance with the recommendations made in the TIA/EIA-568-C document, manufacturer's recommendations and best industry practices.
3. Pair untwist at the termination shall not exceed 3.18mm (0.125 inch).
4. Bend radius of the cable in the termination area shall not be less than 4 times the outside diameter of the cable.
5. The cable jacket shall be maintained to within 25mm (one inch) of the termination point.
6. Data jacks, unless otherwise noted in drawings, shall be located in the bottom position(s) of each faceplate. Data jacks in horizontally oriented faceplates shall occupy the right-most position(s).

D. Horizontal Distribution Cable Installation

1. Cable shall be installed in accordance with manufacturer's recommendations and best industry practices.
2. A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.
3. Cable raceways shall not be filled greater than the TIA/EIA-569-A maximum fill for the particular raceway type
4. Cables shall be installed in continuous lengths from origin to destination (no splices) except for transition points, or consolidation points.
5. Where transition points, or consolidation points are allowed, they shall be located in accessible locations and housed in an enclosure intended and suitable for the purpose. The cable's minimum bend radius and maximum pulling tension shall not be exceeded.
6. If a J-hook or trapeze system is used to support cable bundles all horizontal cables shall be supported at a maximum of 48-to-60-inch (1.2 to 1.5 meter) intervals. At no point shall cable(s) rest on acoustic ceiling grids or panels.
7. Horizontal distribution cables shall be bundled in groups of no more than 25 cables. Cable bundle quantities in excess of 25 cables may cause deformation of the bottom cables within the bundle and degrade cable performance.
8. Cable shall be installed above fire-sprinkler systems and shall not be attached to the system or any ancillary equipment or hardware. The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.

9. Cables shall not be attached to ceiling grid or lighting fixture wires. Where support for horizontal cable is required, the contractor shall install appropriate carriers to support the cabling.
10. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the contractor prior to final acceptance at no cost to the Owner.
11. Cables shall be identified by a self-adhesive label in accordance with the System Documentation Section of this specification and ANSI/TIA/EIA-606-A. The cable label shall be applied to the cable behind the faceplate on a section of cable that can be accessed by removing the cover plate.
12. Unshielded twisted pair cable shall be installed so that there are no bends smaller than four times the cable outside diameter at any point in the run and at the termination field.
13. Pulling tension on 4-pair UTP cables shall not exceed 25-lbf for a four-pair UTP cable.

E. Vertical Outlet Pole and Surface Raceway

1. Vertical outlet poles and Surface Raceway refers to a surface raceway system used for branch circuit wiring and/or data network, voice, video and other low-voltage cabling. Surface raceway shall be used in solid wall applications or for applications where moves, additions and changes are very typical to the workflow.
2. The raceway system shall consist of raceway, appropriate fittings and accessories to complete installation per electrical drawings. Non-metallic surface raceway is to be utilized in dry interior locations only as covered in Article 352, part B of the NEC, as adopted by the NFPA and as approved by the ANSI.

F. Horizontal Cross Connect Installation

1. Cables shall be dressed and terminated in accordance with the recommendations made in the TIA/EIA-568-C standard, manufacturer's recommendations and best industry practices.
2. Pair untwist at the termination shall not exceed 3.18 mm (0.125 inch).
3. Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.
4. Cables shall be neatly bundled and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.
5. The cable jacket shall be maintained as close as possible to the termination point.
6. Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

G. Copper Termination Hardware

1. Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA-568-C standard, manufacturer's recommendations and best industry practice.
2. Pair untwist at the termination shall not exceed 3.18mm (0.125 inch). Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.

3. Cables shall be neatly bundled and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.
4. The cable jacket shall be maintained to within 25 mm (one inch) of the termination point.
5. Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

#### H. Identification and Labeling

1. The contractor's RCDD shall submit for approval a labeling system for the cable installation. The owner's telecommunications representative will have final approval labeling scheme with the successful contractor. At a minimum, the labeling system shall clearly identify all components of the system: racks, cables, panels and outlets. The labeling system shall designate the cables origin and destination and a unique identifier for the cable within the system. Racks and patch panels shall be labeled to identify the location within the cable system infrastructure. All labeling information shall be recorded on the as-built drawings and all test documents shall reflect the appropriate labeling scheme.
2. All label printing will be machine generated by printers using indelible ink ribbons or cartridges. Self-laminating labels will be used on cable jackets, appropriately sized to the OD of the cable, and placed within view at the termination point on each end. Outlet, patch panel and wiring block labels shall be installed on, or in, the space provided on the device.

#### I. Testing and Acceptance

##### 1. General

- a. All cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance under installed conditions according to the requirements of ANSI/TIA/EIA-568-C-1 Section 11. All pairs of each installed cable shall be verified prior to system acceptance. Any defect in the cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors in all cables installed.
- b. All cables shall be tested in accordance with this document, the ANSI/TIA/EIA standards, the manufacturer's warranty guidelines and best industry practice. If any of these are in conflict, the Contractor's RCDD shall bring any discrepancies to the attention of the project team for clarification and resolution.

##### 2. Copper Channel Testing

- a. All twisted-pair copper cable links shall be tested for compliance to the requirements in ANSI/TIA/EIA/568-C.2 for the appropriate Category of cabling installed.

J. System Documentation

1. Upon completion of the installation, the telecommunications contractor shall provide three (3) full documentation sets to the Engineer/End User for approval. Documentation shall include the items detailed in the sub-sections below.
2. Documentation shall be submitted within ten (10) working days of the completion of each testing phase. This is inclusive of all test results and draft as-built drawings. Draft drawings may include annotations done by hand. Machine generated (final) copies of all drawings shall be submitted within 30 working days of the completion of each testing phase. At the request of the Engineer, the telecommunications contractor shall provide copies of the original test results.
3. The Engineer may request that a 10% random field re-test be conducted on the cable system, at no additional cost, to verify documented findings. Tests shall be a repeat of those defined above. If findings contradict the documentation submitted by the telecommunications contractor, additional testing can be requested to the extent determined necessary by the owner's telecommunication representative, including a 100% re-test. This re-test shall be at no additional cost to the Owner.
4. Test Results documentation shall be provided in electronic format within three weeks after the completion of the project. The media shall be clearly marked on the outside front cover with the words "Project Test Documentation", the project name, and the date of completion (month and year). The results shall include a record of test frequencies, cable type, conductor pair and cable (or outlet) I.D., measurement direction, reference setup, and crew member name(s). The test equipment name, manufacturer, model number, serial number, software version and last calibration date will also be provided at the end of the document. Unless the manufacturer specifies a more frequent calibration cycle, an annual calibration cycle is anticipated on all test equipment used for this installation. The test document shall detail the test method used and the specific settings of the equipment during the test as well as the software version being used in the field test equipment.
5. The field test equipment shall meet the requirements of ANSI/TIA/EIA-568-C. The appropriate level III tester shall be used to verify Category 6a F/UTP cabling systems.
6. Printouts generated for each cable by the wire test instrument shall be submitted as part of the documentation package. Alternately, the telecommunications contractor may furnish this information in electronic form. The media shall contain the electronic equivalent of the test results as defined by the specification along with the software necessary to view and evaluate the test reports.
7. When repairs and re-tests are performed, the problem found and corrective action taken shall be noted, and both the failed and passed test data shall be documented. The As-Built drawings are to include cable routes and outlet locations. Their sequential number as defined elsewhere in this document shall identify outlet locations. Numbering, icons, and drawing conventions used shall be consistent throughout all documentation provided. The Architect will provide floor plans in paper and electronic (DWG, AutoCAD rel. 14) formats on which as-built construction information can be added. These documents will be modified accordingly by the telecommunications contractor to denote as-built information as defined above and returned to the Owner.
8. The Contractors shall annotate the base drawings and return a hard copy (same plot size as originals) and electronic (AutoCAD rel.14) form

3.6 FIELD OR SITE QUALITY CONTROL

- A. Refer to section 27 00 00 for general requirements.

3.7 CLEANING

- A. Clean up and remove all dust, dirt and debris created by work.

END OF SECTION 271500



## SECTION 283100 - FIRE ALARM SYSTEM EXTENSION

### PART 1 GENERAL

#### 1.1 SUMMARY

- A. This Section includes general criteria required for extension and modifications of the existing fire alarm system. This Contract shall include the provision of all fire alarm devices, transponder panels, components, accessories and complete wiring back to the fire alarm control panel. The extent, location and details of the fire alarm system is as indicated on the Drawings. The Contractor shall remove and replace all fire alarm system equipment on the ninth floor at new locations shown on the Drawings. All new equipment shall be GE, Edward, EST - No Substitutions.

#### 1.2 REFERENCES

- A. National Electrical Code (NEC) Compliance: Comply with applicable requirements of NEC standards pertaining to fire alarm systems.
- B. UL Compliance and Labeling: Comply with provisions of UL safety standards pertaining to fire alarm systems; and provide products and components which are UL listed and labeled. Reference Fire Protection Equipment Directory with Supplement.
- C. UL listed as Control Units System (UOJZ).
- D. Factory Mutual Engineering Corporation (FM) Compliance: Provide fire alarm systems and accessories which are FM-approved. Equipment devices and components shall be UL listed and FM approved individually and as a system for its intended use of fire protection service labeled by the respective agency Compatibility listing requirements for smoke detectors, thermal detectors and fire alarm system shall be met and certified by the Contractor.
- E. National Fire Protection Association (NFPA) Compliance:
  - 1. NFPA 70: National Electrical Code.
  - 2. NFPA 72: National Fire Alarm Code.
  - 3. NFPA 101: Life Safety Code.
- F. New York State Uniform Fire Prevention and Building Code as amended.
- G. OSHA Rules and Regulations.
- H. The Americans with Disabilities Act.
- I. All requirements of Insurance and other authorities having jurisdiction.

### 1.3 DESCRIPTION OF THE EXISTING SYSTEM

- A. The existing system is a GE, EST 3 system. The main panel is located in the in the Electric Room adjacent to First Floor Main Lobby. Transponder panels are located on the floors.
- B. Present initiating equipment consists of the manual pull stations, smoke detectors, thermal detectors and strobes. Activation of smoke door release, elevator recall, and fan shutdown is also accomplished by the system.

### 1.4 SUBMITTALS

- A. Provide submittals for the devices and components including complete equipment list and catalog descriptive literature for all equipment and wiring. Include composite wiring and/or schematic diagrams of the complete system as proposed to be installed; standard diagrams will not be acceptable. Provide typical terminal wiring diagram for each type of device and for the fire alarm control panel.
- B. Maintenance Data: Submit maintenance data and parts list for each type of fire alarm equipment installed, including furnished specialties and accessories. Include this data, product data and shop drawings in Maintenance Manual, in accordance with requirements of Division 1.
- C. Submittals that fail to comply with the requirements 'listed above shall be rejected.

### 1.5 QUALITY ASSURANCE

- A. Include name, business address and telephone number of nearest fully equipped service organization.
- B. Manufacturer's Qualifications: Firms regularly engaged in manufacture of fire alarm systems of types, sizes, and electrical characteristics required, and whose products have been in satisfactory use in similar service for not less than five (5) years.
- C. Installer's Qualifications: Firm that have at least five (5) years of successful installation experience on projects with fire alarm systems work similar to that required for this project. New York State Fire Alarm License required.

### 1.6 DELIVERY, STORAGE AND HANDLING

- A. Handle fire alarm equipment carefully to prevent damage, breaking and scoring. Do not install damaged equipment or components; replace with new.
- B. Store fire alarm equipment in clean, dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.

## 1.7 MAINTENANCE

- A fully equipped service organization capable of guaranteeing response time within eight (8) hours to service calls shall be available 24 hours a day, seven (7) days a week to service the completed work.

## PART 2 - PRODUCTS

### 2.1 SYSTEM TRANSPONDER SLAVE PANEL(S)

- A. Provide transponder panels as necessary to accommodate new devices.

### 2.2 SIGNAL INITIATING DEVICES

- A. General:

1. Fire detection devices that receive their power from the initiating circuit of a fire alarm control panel shall be listed for use with the control panel.
2. All detectors shall be equipped with a secure base with a concealed locking mechanism to prevent unauthorized removal, be UL listed and FM approved.
3. Label point numbers on all signal initiating devices with electronically generated stick-on Kroy tape, minimum 1/4" high black letters. This includes all detective bases, manual pull stations, and remote key stations for duct detectors, etc.

- B. Ceiling Mounted Addressable Smoke Detectors and Heat Detectors:

1. General: Smoke detectors and heat detectors shall have common mounting base which accommodates interchanging of the different type detectors; Edwards Signature Series, SIGA - SB.
2. Smoke Detectors:
  - a. Self-restoring, photoelectric type with multi-color, detector status LED and remote sensitivity measurement capability; Edwards Signature Series, SIGA - OSD Series.
  - b. Programmable from the fire alarm control panel, with base mounted address selection.
  - c. Field-cleanable chamber with replaceable chamber parts.
  - d. Provide with remote indicating light/keyed test switch where indicated on Drawings.

3. Heat Detectors:

- a. Epoxy encapsulated electronic design that is thermistor-based, rate compensated, self-restoring and shall not be affected by thermal lag.
- b. 135°F, combination rate-of-rise/fixed temperature, self-restoring rate-of-rise element, as indicated on Drawings, Edwards Signature Series, SIGA-HRD.
- c. 135°F or 190°F, fixed temperature, as indicated on Drawings.

C. Manual Pull Stations:

1. Semi-flush, dual action non-break glass, push in/pull down type of indoor Lexan construction, bright red finish with molded, raised-letter operating instructions of contrasting color. Equip with key lock for test and reset.
2. Addressable unit, individually supervised and annunciated at the control panel, Edwards Signature Series, SIGA - 278.

D. Addressable Monitor and Control Modules (As Required):

1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to one of the fire alarm control panel SLCs.
2. Addressable control modules shall be provided to supervise and control the operation of one conventional NACs of compatible, 24 VDC powered, polarized audio/visual notification appliances.
3. Monitor and control modules shall be available in a miniature package and shall mount in a standard 4: square electrical outlet box.
4. Modules shall receive their operating power from the signaling line circuit or a separate two wire pair running from an appropriate power supply as required.

E. Addressable Relay Control Module (As Required):

1. Addressable relay modules shall be available for HVAC control, elevator capture and other building functions.
2. The relay shall be form C contact and rated for a minimum of 2.0 Amps resistive or 1.0 Amps inductive.
3. Relay coil shall be magnetically latched to reduce wiring connection requirements, and to ensure that 100% of all auxiliary relay or NACs may energized at the same time on the same pair of wires.

2.3 ALARM INDICATING DEVICES

A. Audible/Visual Alarms:

1. For wall type applications, provide semi-flush wall mounted speaker unit, equipped with xenon flashtube strobe with clear lens having FIRE imprinted thereon in white letters on red base. Units shall be equipped with field selectable candela settings of 15, 30, 75, or 110 cd. Edwards Genesis GA Series.

2. For wall type applications in mechanical rooms and unfinished areas, provide surface addressable wall mounted unit equipped with xenon 110 candela flashtube strobe with clear lens having FIRE imprinted thereon in white letters on red base, Edwards Genesis GA Series with appropriate adapter plate and red surface mounting box.
3. In areas where designated "WP", provide weatherproof appliances suitable for environmental conditions.
4. For ceiling applications, provide semi-flush addressable speaker strobe, nominally 6.8" diameter x 4.7" deep, red lettering on white housing with field selectable candela settings of 15, 30, 75, or 95 cd.

B. Visual Alarms:

1. For semi-flush addressable wall mounted applications, 24 volts DC, with built-in ADA compliant xenon flasher consisting of protruding pyramid shaped clear lens with white "FIRE" lettering on red base. Each unit shall have field selectable candela settings of 15, 75, 110, 135 or 185 cd, Edwards Genesis Series.
2. For ceiling addressable applications, provide semi-flush clear lens strobe, red base color with field selectable candela settings of 15, 30, 75, or 110 cd, Edwards Genesis Series.

2.4 WIRING

- A. Replace all existing wiring and provide new. All fire alarm wiring shall be provided in approved raceway systems.
- B. Initiating device circuits and indicating appliance circuits shall utilize UL listed power limited fire, protective signaling insulated conductors and be a Class B system.
- C. All wiring shall be electronically supervised. 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.
- D. Number of conductors and conductor sizes shall be as recommended by system manufacturer, except that conductor size shall be not less than #14 AWG twisted pairs for NAC circuits and #16 AWG twisted pairs for initiating circuits and/or manufacturer's representatives' recommendations.
- E. Minimum insulation rating shall be 105°C; bell wire or thermostat wiring is not acceptable.
- F. Use shielded and twisted pairs as recommended by the manufacturer producing the system, to minimize the effects of transients, EMI, RFI and other interferences. Follow manufacturer's recommendations to prevent electrical and/or audio cross-talk between conductors in the same circuit.
- G. All wiring shall be provided in specified raceway systems.

- H. Raceways containing conductors identified as "Fire Protective Alarm System" conductors shall not contain any other conductors and no AC current carrying conductors shall be allowed in the same raceway.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF BASIC WIRING SYSTEM MATERIALS

- A. Extend existing fire alarm circuits as required.
- B. Install all wiring in accordance with manufacturer's printed instructions and recommendations. Run all wiring within raceways and in a separate, segregated raceway system.
- C. Install wires and cables without splices. Make connections at terminal strips in cabinets or at equipment terminals. Make soldered splices in electronic circuits in control cabinets.
- D. Do not run nonpower-limited and power-limited circuits in the same raceway or cable. Do not run nonpower-limited and power-limited circuits in same junction box or cabinets without appropriate barriers between the two types of circuits.
- E. Use minimum #16 AWG conductor size; circuits shall be two wire, Class B, with end-offline resistors.
- F. Power supply circuits shall be minimum #12 AWG. Provide 20 ampere, 120-volt circuits to the fire alarm control panel as necessary from emergency panel noted on drawings.
- G. Mount end-of-line device in box with last device or separate box adjacent to fast device in circuit and label.
- H. All wiring shall conform to NEC Articles 725 and 760, and to NFPA-72, "Local Protective Signaling Systems".
- I. All devices shall be kept clean by either dust covers or installing after General Contractor Work is substantially dust free and complete.

### 3.2 INSTALLATION OF FIRE ALARM SYSTEMS

- A. Install fire alarm system as indicated and provide necessary programming and modifications to panel as required to accommodate work, in accordance with equipment manufacturer's written instructions and complying with applicable portions of NEC.

- B. Pre-test existing system to ascertain performance and document in writing any deficiencies prior to new work.

### 3.3 FIELD QUALITY CONTROL

- A. The sensitivity of all smoke detectors shall be tested and replaced, if necessary, immediately following completion work. Electrical Contractor shall be responsible to ensure all smoke detectors and appurtenances are kept in an acceptably clean state as determined by Engineer and/or County Fire Inspector.
- B. Preliminary System Test:
  - 1. Preparation: Have the completed system adjusted and then operate long enough to assure that it is performing properly.
  - 2. Run a preliminary test for the purpose of:
    - a. Determining whether the system is in a suitable condition to conduct an acceptance test.
    - b. Checking and adjusting equipment.
    - c. Training facility personnel.
- C. Provide signed certification of system completion per Figure 1-6.2.1 in NFPA 72, to Owner and Architect.
- D. The entire system provided under this project shall be covered by a one-year guarantee after date of substantial completion. Date of substantial complete shall be determined by the Engineer. Any replacement of parts and/or equipment shall be made by the manufacturer at no cost.

### 3.4 OPERATION AND MAINTENANCE MANUALS

- A. Operating and maintenance instruction manuals shall include the following:
  - 1. Step-by-step procedures for system start-up and operation.
  - 2. Manufacturer's name, model number, service manual parts list and brief description of all equipment and its basic operating features.
  - 3. Trouble shooting guide listing possible breakdowns and repair.
  - 4. Complete record drawings for fire alarm wiring diagrams showing typical connection diagrams for each type of device and a complete riser diagram showing all devices, addresses, zones, and wiring requirements. Record Drawings for fire alarm wiring diagram shall show all terminal connections at the Fire Alarm Control Panel. Submit one set of reproducible documents to the Owner.
  - 5. Instruction report stating when instruction was given and who was in attendance, signed by the Owner.

3.5 TRAINING

- A. Preparation: Coordinate with and give 72 hours notice of training to Owner.
- B. Provide the services of the Company Field Advisor for two 2-hour sessions to train facility personnel on the use, operation and maintenance of the system.

END OF SECTION 283100



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**PLEASE NOTE: SECTIONS THAT HIGHLIGHTED MUST BE FILLED OUT TO COMPLETE THIS CONTRACT. THIS INCLUDES CONTENT IN PAGE 1, SECTIONS 4.20, THE SIGNATURE PAGE & SCHEDULE A. DELETE THIS TEXT BEFORE FINALIZING THIS AGREEMENT.**

Contract Number: \_\_\_\_\_

This Agreement (referred to alternately as "Agreement" or "Contract") made as of the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, for Contract Number \_\_\_\_\_ by and between STATE UNIVERSITY OF NEW YORK, a corporation organized and existing under the laws of the State of New York, with its principal office located at State University Plaza, 353 Broadway, Albany, New York 12246, on behalf of State University of New York at Buffalo located at 119 John Beane Center, Buffalo, New York 14260 hereinafter referred to as "University" and \_\_\_\_\_ having its principal office located at \_\_\_\_\_, and a Federal ID or Social Security No. of {insert number} and a New York State SFS ID # \_\_\_\_\_, hereinafter referred to as "the Contractor."

**WITNESSETH:**

The parties hereto agree that the Contractor shall:

(a) furnish and perform all work of every kind required and all other things necessary to complete in the most substantial and workmanlike manner the construction of

**{Campus Let Project Number}**  
**{Project Title}**  
**At {Campus}**

in strict accordance with the Contract Documents; and

(b) complete all work necessary for substantial completion by {insert completion date} or within the time to which such completion may have been extended in accordance with the Contract Documents. The expiration date for this agreement shall be (add one year) \_\_\_\_\_ to allow for the guarantee period and project close-out;

(c) in the event it fails to substantially complete all the work on time, pay to the University liquidated damages in accordance with the liquidated damages schedule listed on page one of the contractors proposal for each calendar day of delay of substantially completing all the work; and

(d) do everything required by the Contract; subject, however, to the terms, provisions and conditions listed hereinafter.

(e) The University shall pay and the Contractor shall accept as full and complete payment for the performance of this Agreement, subject to additions or deductions as provided herein, the total contract compensation of \$ \_\_\_\_\_, (in figures), \_\_\_\_\_ (in words).

**Article I**  
**General Provisions**

**Section 1.01 Definitions**

Where the following words and expressions are used in the Contract Documents it is understood that they have the meaning set forth as follows:

**Allowance** Any and all work and materials which may be required of the Contractor in performing work set forth under one or more allowances to this Agreement shall be Work, as defined herein, which shall be performed in accordance with the base schedule for the performance of the Contractor's Work. Contractor shall not be entitled to an extension of time for the performance of an allowance or all allowances.

**Consultant** The Architect or Engineer named in the Notice to Bidders or such other person or firm designated by the University to provide general administration of the Contract and inspection of the work.

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Bidding Documents	Notice to Bidders, Information for Bidders and Proposals
Bonds	Performance Bond and Labor and Material Bond
Delay	For purposes of this document and as used herein and in any other contract documents between the Contractor and the University the word "delay" shall be interpreted broadly and shall include by way of example only and not by way of limitation: delay, disruption, interference, inefficiencies, impedance, hindrance, acceleration, resequencing, schedule impacts, lack of timeliness by the University and/or Consultant, and lack of coordination, cumulative impact of multiple change orders, delay and other impacts.
Contract or Contract Documents	The Agreement, Exhibits A and A-1, Bidding Documents, Bonds, Specifications, Project Manual, Drawings Addenda issued prior to the opening of bids and Change Orders issued after award of the Contract.
University	State University of New York
Notice to Proceed	Written notice provided by the University to the Contractor stating the date on which the contractor can begin project work.
Project	The facility or facilities to be constructed including all usual, appropriate and necessary attendant work shown on, described in or mentioned in the Contract.
Site	The area within the Contract limit lines, as shown on the Drawings, and all other areas upon which the Contractor is to perform work.
Substantial Completion	Substantial Completion is the completion of Work so that the Project can be fully occupied and used for the purposes for which it is intended. Substantial Completion includes: (1) completion of all work required for the issuance of a code compliance certificate, or a temporary approval for occupancy, completed in a manner that includes no uncorrected deficiency or material violation of the Building Code of New York State within the area or work for which the certificate is to be issued; (2) completion of all building systems and functional testing of said systems (other than tests that cannot be performed due to the seasonal environmental conditions in effect at the time of completion); (3) acceptance and approval of the Operating Instructions and Manuals and Training of Campus Personnel; and (4) the sum of values determined for Punch List work at the time of Substantial Completion shall not exceed one (1) percent of the amount of the Contract consideration unless otherwise agreed to by the University.
Work	The using, performing, installing, furnishing and supplying of all materials, equipment, labor, services and incidentals necessary or proper for or incidental to the successful completion of the Project and the carrying out of all duties and obligations imposed upon the Contractor by the Contract.

**Section 1.02 Captions**

The titles or captions of Articles and Sections of the Contract are intended for convenience and reference purposes only and in no way define, limit or describe the scope or intent thereof or of the Contract or in any way affect the Contract.

**Section 1.03 Nomenclature**

Materials, equipment or other work described in words and abbreviations which have a well-known, technical or trade meaning shall be interpreted as having such meaning in connection with the Contract.

**Section 1.04 Entire Agreement**

The Contract constitutes the entire agreement between the parties hereto and no statement, promise, condition, understanding, inducement or representation, oral or written, expressed or implied, which is not contained herein shall be binding or valid and the Contract shall not be changed, modified, or altered in any manner except by an instrument in writing executed by the parties hereto.

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**Section 1.05 Successors, Assigns and Agents**

To the extent allowed by the terms of "Exhibit A", the Contract shall bind the successors, assigns and representatives of the parties hereto. The University reserves the right to have the State University Construction University Fund act as its agent at any time or duration of this Agreement. Such designation of the Fund to act on the behalf of the University shall be in writing and addressed to the Contractor.

**Section 1.06 Accuracy and Completeness of Contract Documents**

- (1) The Contract Documents are complementary and what is called for by any one shall be as binding as if called for by all. The intention of the Documents is to include all materials, plant, equipment, tools, skill and labor of every kind necessary for the proper execution of the work and also those things which may be reasonably inferable from the Contract Documents as being necessary to produce the intended results.
- (2) The Contract Documents contemplate a finished piece of work of such character and quality as is reasonably inferable from them. The Contractor acknowledges that the Contract consideration includes sufficient money allowance to make its work complete and operational and in compliance with good practice and it agrees that inadvertent minor discrepancies or omissions or the failure to show details or to repeat on any part of the Contract Documents the figures or notes given on another shall not be the cause for additional charges or claims. In case of a conflict between any part or parts of the Contract Documents with any other part or parts thereof, as contrasted to an omission or failure to show details or to repeat on any part of the Contract Documents the figures or notes given on another part thereof, the following shall be given preference, in the order hereinafter set forth, to determine what work the Contractor is required to perform: (a) Exhibit A and A-1, (b) Addenda (later dates to take preference over earlier dates); (c) Amendments to Agreement; (d) Agreement; (e) Bidding Documents; (f) Specifications; (g) Schedules (i.e. finish schedules); (h) Large scale detail Drawings (detail drawings having a scale of 3/4" and over); (i) Large scale plan and section Drawings (plan and section drawings having a scale equal to or larger than that used for the basic floor or site plan, as the case may be); (j) Small scale detail Drawings (detail drawings having a scale of less than 3/4"); and (k) Small scale plan and section Drawings (plan and section drawings having a scale less than that used for the basic floor or site plan, as the case may be). In the event of such a conflict between or among parts of the Contract Documents that are entitled to equal preference, the more expensive way of doing the work, the better quality or greater quantity of material shall govern unless the University otherwise directs.

**Section 1.07 Organization of Contract Documents**

The Specifications and Drawings are generally divided into trade sections for the purpose of ready references, but such division is arbitrary and such sections shall not be construed as the prescription by the Consultant or the University of the limits of the work of any subcontractor or as a determination of the class of labor or trade necessary for the fabrication, erection, installation or finishing of the work required. The Contractor will be permitted to allot the work of subcontractors at its own discretion regardless of the grouping of the Specifications and Drawings. It shall be the Contractor's responsibility to settle definitively with each subcontractor the portions of the work which the latter will be required to do. The University and the Consultant assume no responsibility whatever for any jurisdiction claimed by any of the trades involved in the work.

**Section 1.08 Furnishing of Contract Documents**

The University shall establish the format for the Contract Documents (hard copy and/or electronic media) at the start of the Project. The Contractor shall be furnished, free of charge, with two (2) copies of the Specifications and Drawings in the selected format(s). Any other copies of the Specifications and Drawings which the Contractor may desire can be obtained at the Contractors expense.

**Section 1.09 Examination of Contract Documents and Site**

By executing the Contract, the Contractor agrees that it has carefully examined the Contract Documents together with the site of the proposed work as well as its surrounding territory; that it is fully informed regarding all the conditions affecting the work to be done and the labor and materials to be furnished for the completion of the Contract; and that its information has been acquired by personal investigation and research and not in the estimates and records of the University.

**Section 1.10 Invalid Provisions**

If any term or provision of the Contract Documents or the application thereof to any person, firm or corporation or circumstance shall, to any extent, be invalid or unenforceable, the remainder of the Contract Documents, or the



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application of such terms or provisions to persons, firms or corporations or circumstances other than those to which it is held invalid or unenforceable, shall not be affected thereby and each term or provision of the Contract Documents shall be valid and be enforced to the fullest extent permitted by law.

**Section 1.11 No Collusion or Fraud**

The Contractor hereby agrees that the Contract was secured without collusion or fraud and that neither any officer nor any employee of the University has or shall have a financial interest in the performance of the Contract or in the supplies, work or business to which it relates, or in any portion of the profits thereof.

**Section 1.12 Notices**

- (1) All notices permitted or required hereunder shall be in writing and shall be transmitted either:
- a. via certified or registered United States mail, return receipt requested;
  - b. by personal delivery;
  - c. by expedited delivery service; or
  - d. by email if actually received by the University. Contractor bears the burden of proof of service by email and receipt of email by the University.

Such notices shall be addressed as follows or to such different addresses as the parties may from time to time designate:

State University of New York at Buffalo

Name: Tonga Pham

Title: Associate Vice President University Facilities

Address: 119 John Beane Center Buffalo, New York 14260

E-mail address: tongapha@buffalo.edu

{insert company name}

Name: {insert designated contact's title}

Title: {insert designated contact's title}

Address: {insert company}

E-mail Address: {insert email}

- (2) Any such notice shall be deemed to have been given either at the time of personal delivery or actual receipt by the University, or in the case of email, upon receipt by the University.
- (3) The parties may, from time to time, specify any new or different address in the United States as their address for purpose of receiving notice under this Agreement by giving fifteen (15) days written notice to the other party sent in accordance herewith. The parties agree to mutually designate individuals as their respective representatives for the purposes of receiving notices under this Agreement. Additional individuals may be designated in writing by the parties for purposes of implementation and administration/billing, resolving issues and problems and/or for dispute resolution.

**Section 1.13 Singular-Plural; Male-Female**

As used in the Contract Documents, the singular of any word or designation, whenever necessary or appropriate, shall include the plural and vice versa, and the masculine gender shall include the female and neutral genders and vice versa.

**Article II**  
**Contract Administration and Conduct**

**Section 2.01 Consultant's Status**

- (1) The Consultant, as the University's representative, shall provide general administration of the Contract and inspection of the work. The Consultant will not be responsible for construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the work, and it will not be responsible for the Contractor's failure to carry out the work in accordance with the Contract Documents. The Consultant's duties, services and work shall in no way supersede or dilute the Contractor's obligation to perform the work in conformance with all Contract requirements, but it is empowered by the University to act on its behalf

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with respect to the proper execution of the work and to give instructions and/or direction when necessary to require such corrective measures as may be necessary, in its professional opinion, to insure the proper execution of the Contract or to otherwise protect the University's interest.

- (2) The Consultant shall have the authority to stop the work or to require and/or direct the prompt execution thereof whenever such action may be necessary, in its professional opinion, to insure the proper execution of the Contract or to otherwise protect the interests of the University.
- (3) Except as otherwise provided in the Contract, the Consultant shall determine the amount, quality, acceptability, fitness and progress of the work covered by the Contract and shall decide all questions of fact which may arise in relation to the interpretation of the plans and Specifications, the performance of the work and the fulfillment by the Contractor of the provisions of the Contract. The Consultant shall in the first instance be the interpreter of the provisions of the Contract and the judge of its performance and it shall use its power under the Contract to enforce its faithful performance.

**Section 2.02 Finality of Decisions**

- (1) Any decision or determination of the Consultant under the provisions of the Contract shall be final, conclusive and binding on the Contractor unless the Contractor shall, within ten (10) working days after such decision, make and deliver to the University a verified written statement of its contention that the decision of the Consultant is contrary to a provision of the Contract. The University shall thereupon determine the validity of the Contractor's contention. Pending decision by the University, the Contractor shall proceed in accordance with the Consultant's decision.
- (2) Wherever it is provided in the Contract Documents that an application must be made to the University and/or determination made by the University, the University's decision on such application and/or its determination under the Contract Documents shall be final, conclusive and binding upon the Contractor unless the Contractor, within ten (10) working days after receiving notice of the University's decision or determination, files a written statement with the University and the Consultant that it reserves its rights in connection with the matters covered by said decision or determination and after a court of competent jurisdiction determines the University's said decision or determination to be fraudulent, capricious, arbitrary or so grossly erroneous as necessarily to imply bad faith in an action brought in accordance with Section 4.24.

**Section 2.03 Claims and Disputes**

- (1) If the Contractor claims (i) that any work it has been ordered to do is extra work or (ii) that it has performed or is going to perform extra work or (iii) that any action or omission of the University or the Consultant is contrary to the terms and provisions of the Contract, it shall:
  - a. Promptly comply with such order;
  - b. Notwithstanding the provisions of Section 1.12 of the Agreement and any other provisions of the Contract documents to the contrary, file with the University and the Consultant, within five (5) working days after being ordered to perform the work claimed by it to be extra work or within five (5) working days after commencing performance of the extra work, whichever date shall be the earlier, or within fifteen (15) working days after the said action or omission on the part of the University or the Consultant occurred, a written notice of the basis of its claim and request a determination thereof.
  - c. Notwithstanding the provisions of Section 1.12 of the Agreement and any other provisions of the Contract documents to the contrary, file with the University and the Consultant, within thirty (30) calendar days after said alleged extra work was required to be performed or said alleged extra work was commenced, whichever date shall be the earlier, or said alleged action or omission by the University or the Consultant occurred, a verified detailed statement, with documentary evidence, of the items and basis of its claim, including an initial and updated detailed Time Progress Schedule,
  - d. Produce for the University's examination, upon notice from the University, such information and documentation as directed by the University, which shall include but not be limited to job cost reports and all estimates and documentation used to develop the Bid Proposal, all its books of account, bills, invoices, payrolls, subcontracts, time books, progress records, daily reports, bank deposit books, bank statements, checkbooks and cancelled

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checks, showing all of its actions and transactions in connection with or relating to or arising by reason of its claim, and submit persons in its employment and in its subcontractors' employment for examination under oath by any person designated by the University to investigate any claims made against the University under the Contract, such examination to be made at the offices of the Contractor; and

- e. Proceed diligently, pending and subsequent to the determination of the University with respect to any such disputed matter, with the performance of the Contract and in accordance with all instructions of the University and the Consultant.
- (2) The Contractor's failure to comply with any or all parts of subdivision b, c and d of paragraph (1) of this Section shall be deemed to be: (i) a conclusive and binding determination on its part that said order, work, action or omission does not involve extra work and is not contrary to the terms and provisions of the Contract; and (ii) a waiver by the Contractor of all claims for additional compensation or damages as a result of said order, work, action or omission. The provisions of subdivision b, c and d of paragraph (1) of this Section are for the purpose of enabling the University to avoid waste of public funds by affording it promptly the opportunity to cancel or revise any order, change its plans, mitigate or remedy the effects or circumstances giving rise to a claim or take such other action as may seem desirable and to verify any claimed expenses or circumstances as they occur. Compliance with such provisions is essential whether or not the University is aware of the circumstances of any order or other circumstances which might constitute a basis for a claim and whether or not the University has indicated it will consider a claim in connection therewith.
- (3) The Contractor's failure to submit and maintain a Time Progress Schedule in accordance with Section 3.02 of the Agreement shall be deemed to be a waiver by the Contractor of all claims for additional time, compensation or damages as a result of any condition which is an alleged cause of delay in the completion of the work. The Schedule of Record, regularly updated and submitted at required durations in accordance with the provisions of the General Requirements, Section paragraph titled "Project Schedule": (i) informs the University and affords it promptly of regular opportunities to change its plans or mitigate or remedy the effects or circumstances giving rise to a claim of delay in the completion of the work or take such other action as may seem desirable to verify any claimed circumstances as they occur; and (ii) forms a record which becomes the basis of the University's verification of an alleged cause of delay in the completion of the work.
- (4) No person has power to waive or modify any of the foregoing provisions and, in any action against the University to recover any sum in excess of the sum certified by the University to be due under or by reason of the Contract, the Contractor must allege in its complaint and prove at the trial compliance with the provisions of this Section.
- (5) Nothing in this Section shall in any way affect the University's right to obtain an examination before trial or a discovery and inspection in any action that might be instituted by or against the University or the Contractor.

**Section 2.04 Omitted Work**

The University reserves the right at any time during the progress of the work to delete, modify or change the work covered by the Contract, by a Change Order or Field Order thereto providing for either a reduction or omission of any portion of the work, without constituting grounds for any claim by the Contractor for allowances for damages or for loss of anticipated profits and in such event a deduction shall be made from the Contract consideration, the amount of which is to be determined in accordance with the provisions of Section 4.02 or 4.05A of the Agreement.

**Section 2.05 Extra Work**

- (1) The University reserves the right at any time during the progress of the work to add, modify or change the work covered by the Contract by Change Order or Field Order or as otherwise required by the University thereto providing for extra work of either a qualitative or quantitative nature and in such event the Contract consideration may be increased by an amount to be determined in accordance with the provisions of Sections 4.02 and 4.05A of the Agreement and the completion date for all or any part of the work may be extended for such period of time as may be determined by the University as necessary, because of the extra work, to complete the work or any part thereof.
- (2) Nothing in the Contract Documents shall excuse the Contractor from proceeding with the extra work as directed., The terms and conditions of the Contract Documents shall be fully applicable to all extra work.



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- (3) The Contractor shall have no claim for extra work or an extension of time if the performance of such work, in the judgment of the Consultant, is made necessary or desirable because of any act or omission of the Contractor which is not in accordance with the Contract.
- (4) Notwithstanding the provisions of Section 2.02 of the Agreement and any other provisions of the Contract Documents to the contrary, the University, after conferring with the Consultant, shall have the right to overrule a determination or decision of the Consultant, that relates to whether certain work is included in the Contract Documents or is extra work, which the University believes is incorrect; in the event the University exercises such right, that determination or decision shall be final, conclusive and binding upon the Contractor and the University unless the same shall be determined by a court of competent jurisdiction to have been fraudulent, capricious, arbitrary or so grossly erroneous as necessarily to imply bad faith.

**Section 2.06 Contractor to Give Personal Attention**

- (1) The Contractor shall give its constant personal attention to all the work while it is in progress and shall place the work in charge of a competent and reliable full-time superintendent acceptable to the Consultant and the University who shall have authority to act for the Contractor and who shall be accountable to the Consultant to the extent provided in the Contract. Unless the superintendent proves to be unsatisfactory to the Contractor and ceases to be in its employ, such superintendent shall not be changed without the written permission of the Consultant and the University.
- (2) When the Contractor and its superintendent are temporarily absent from the site of the work, the Contractor or its superintendent shall designate a responsible supervisory employee, approved by the Consultant and the University, to receive such orders as the Consultant or its representative may give. At no time shall any work be conducted on the site in the absence of an individual present who has been so designated by the Contractor or its superintendent as having authority to receive and execute instructions given by the Consultant or its representative.
- (3) If the superintendent, project manager or other supervisory employees are not satisfactory to the University, the Contractor shall, if directed by the University, immediately replace such supervisory employees with other supervisory employees acceptable to the Consultant and the University. Such replacement and all related impacts shall be at no additional cost to the University.

**Section 2.07 Employment of Workers**

The Contractor shall at all times employ competent and suitable workers and equipment which shall be sufficient to prosecute all the work to full completion in a disciplined orderly manner and in accordance with the Time Progress Schedule and the contractually required time of performance. All workers engaged in special or skilled work shall have had sufficient experience in such work to properly and satisfactorily perform the same. Should the Consultant deem any employee of the Contractor or any subcontractor incompetent, careless, insubordinate or otherwise objectionable or whose continued employment on the work is deemed by the Consultant to be contrary to the public interest, it shall so advise the Contractor and the latter shall dismiss or shall cause the subcontractor, if such employee is employed by the latter, to dismiss such employee and such employee shall not again be employed on the work to be performed under the Contract without obtaining the prior written approval of the Consultant.

**Section 2.08 Detailed Drawings and Instructions**

Upon timely notice from the Contractor that supplementary information is required, the Consultant shall furnish additional instructions, by means of Drawings or otherwise, necessary for the proper execution of the work. All such Drawings and instructions shall be consistent with the Contract Documents, true developments thereof and reasonably inferable therefrom. The work shall be executed in conformity therewith and the Contractor shall do no work without proper Drawings and/or instructions.

**Section 2.09 Contract Documents to Be Kept at Site**

The Contractor shall keep at the site of the work a copy of the Drawings and Specifications and shall at all times give the Consultant and the University access thereto.

**Section 2.10 Permits and Building Codes**

The Contractor shall obtain from the proper authorities all permits legally required to carry on its work, pay any and all taxes and fees legally required and shall be responsible for conducting its operations in accordance with the provisions

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of such permits. Except as otherwise expressly provided in the Contract Documents, all of the work covered by this Agreement which is to be performed on property owned by the State University of New York is not subject to the building code of any city, county or other political subdivision of the State of New York. It is, however, subject to the provisions of the Building Code of New York State and the applicable Federal and State health and labor laws and regulations.

**Section 2.11 Surveys**

- (1) From the data shown on the Drawings and identified at the site by the Consultant, a licensed surveyor, to be designated and paid for by the University, shall establish one (1) fixed benchmark and one (1) fixed base line at the site. The Contractor shall work from the benchmarks and base lines shown on the Drawings, identified at the site by the Consultant and established at the site by the aforesaid surveyor and shall establish such supplementary bench marks and base lines that are required in order for it to lay out the work. The Contractor shall be responsible for all measurements that may be required for execution of the work to the exact position and elevation as prescribed in the Specifications, shown on the Drawings, or as the same may be modified at the direction of the Consultant to meet changed conditions or as a result of modifications to the work covered by the Contract.
- (2) The Contractor shall furnish at its own expense such stakes and other required equipment, tools and materials, and all labor as may be required in laying out any part of the work. If, for any reason, monuments are disturbed, it shall be the responsibility of the Contractor to reestablish them, without cost to the University, as directed by the Consultant. The Consultant may require that construction work be suspended at any time when location and limit marks established by the Contractor are not reasonably adequate to permit checking completed work or the work in progress.
- (3) In all multiple-story construction, the Contractor shall establish and maintain line marks at each floor level and grade marks four (4) feet above the finished floor at each floor level.

**Section 2.12 Site Conditions**

- (1) The Contractor acknowledges that it has assumed the risk and that the Contract consideration includes such provision as it deems proper for all physical conditions and subsurface conditions as it could reasonably anticipate encountering from the provisions of the Contract Documents, borings, rock cores, topographical maps and such other information as the University or the Consultant made available to it prior to the University's receipt of bids or from its own inspection and examination of the site prior to the University's receipt of bids.
- (2) In the event that the Contractor encounters subsurface physical conditions or other latent physical conditions at the site differing substantially from those shown on or described or indicated in the Contract Documents and which could not have been reasonably anticipated from the aforesaid information made available by the University or the Consultant or from the Contractor's aforesaid inspection and examination of the site, it shall give immediate notice to the Consultant of such conditions before they are disturbed. The Consultant will thereupon promptly investigate the conditions and, if it finds that they do substantially differ from that which should have been reasonably anticipated by the Contractor, it shall make such changes in the Drawings and Specifications as may be necessary and a Change Order or Field Order may be issued, the amount of which shall be determined in accordance with the provisions of Sections 4.02 and 4.05A, to reflect any increase or decrease in the cost of, or the time required for, performance of the Contract as a result of any of the aforesaid changes made by the Consultant and/or as a result of such unanticipated subsurface conditions.

**Section 2.13 Right to Change Location**

When additional information regarding the subsurface conditions becomes available to the University as a result of the excavation work, further testing or otherwise, it may be found desirable to change the location, alignment, dimensions or grades to conform to such conditions. The University reserves the right to make such reasonable changes in the work as, in its opinion, may be considered necessary or desirable; such changes and any adjustments in the Contract consideration as a result thereof are to be made in accordance with the provisions of Sections 2.04, 2.05 4.02 and 4.05A of the Agreement.

**Section 2.14 Unforeseen Difficulties**

Except as otherwise expressly provided in Section 2.12 of the Agreement and in other Sections of the Contract Documents, the Contractor acknowledges that it has assumed the risk and that the Contract consideration includes such



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provisions as it deems proper for any unforeseeable obstacles or difficulties which it may encounter in the performance of the work.

**Section 2.15 Moving Materials and Equipment**

Should it become necessary, in the judgment of the Consultant, at any time during the course of the work to move materials which are stored on the site and equipment which has been temporarily placed thereon, the Contractor upon request of the Consultant shall move them or cause them to be moved at its sole cost and expense; provided, however, if materials and equipment that have been stored or placed by the Contractor at a location on the site expressly approved, in writing, by the Consultant and the same are moved or caused to be moved by the Contractor at the Consultant's request, such removal shall be deemed extra work and the Contractor shall be compensated therefor in accordance with the provisions of Sections 4.02 and 4.05A of the Agreement.

**Section 2.16 Other Contracts**

- (1) Prior to and during the progress of the work hereunder the University reserves the right to let or permit the letting of other contracts relating to the Project or in connection with work on sites within the Contract limit lines or adjoining or adjacent to that on which the work covered by this Agreement is to be performed. In the event such other contracts are let, or have previously been let, the Contractor and such other contractors shall coordinate their work with each other, arrange the sequence of their work to conform with the progressive operation of all the work covered by such contracts and afford each other reasonable opportunities for the introduction and storage of their materials, supplies and equipment and the execution of their work. If the Contractor or such other contractors contend that their work or the progress thereof is being interfered with by the acts or omissions of the other or others or that there is a failure to coordinate or properly arrange the sequence of the work on the part of the Contractor or such other contractors, they shall, within five (5) working days of the commencement of such interference or failure of coordination or failure to perform work in proper sequence, give written notification to the University and the Consultant of such contention. Upon receipt of such notification or on its own initiative, the Consultant shall investigate the situation and issue such instructions to the Contractor or such other contractors with respect thereto as it may deem proper. The Consultant shall determine the rights of the Contractor and of such other contractors and the sequence of work necessary to expedite the completion of all work covered by this Agreement in relation to the work covered by said other contracts.
- (2) The Contractor agrees that it has and will make no claim for damages against the University by reason of any act or omission to act by any other contractor or in connection with the Consultant's or University's acts or omissions to act in connection with such other contractor, but the Contractor shall have a right to recover such damages from the other contractors.
- (3) If the proper and accurate performance of the work covered by the Contract depends upon the proper performance and execution of work not included herein or depends upon the work of any other contractor, the Contractor shall inspect and promptly report to the Consultant any defects in such work that render it unsuitable for proper execution and results. Its failure to so inspect and report shall constitute an acceptance of the other contractor's work as fit and proper for the reception of the work covered by the Contract, except as to latent defects which may be discovered thereafter.

**Section 2.17 Inspection and Testing**

- (1) All materials and workmanship shall be subject to inspection, examination and testing by the Consultant and the University at all times during the performance of the work and at all places where the work is carried on. Except as otherwise herein specified, the University shall pay for the cost of inspection, examination and testing by the Consultant or the University. If, however, the tests prove that the materials and/or work tested do not meet the requirements of the Contract, then the entire cost of such tests and any additional testing and or inspections required until the work is deemed compliant is to be borne by the Contractor. The Consultant will have the right to reject defective material and workmanship furnished by the Contractor or require its correction. The Contractor, without charge therefor, shall satisfactorily and promptly correct all rejected work and replace all rejected material with proper material.
- (2) The Contractor shall promptly segregate and remove from the site of the work all rejected material and work. If the Contractor shall fail to proceed at once with the replacing of rejected material and/or correction of defective workmanship, the University may, by contract or otherwise, replace such material and/or correct such

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workmanship, and charge the costs thereof to the Contractor or it may cancel the Contract and terminate the Contractor's employment as provided in the Agreement.

- (3) The Contractor, without additional charge, shall promptly furnish all reasonable facilities, labor materials and equipment with associated operators necessary for the safe and convenient access, inspection and testing that may be required by the Consultant or the University.
- (4) If the Contract Documents or the Consultant's instructions or the applicable laws, ordinances or regulations of any governmental authority require any part of the work covered by the Contract to be specially tested or inspected, the Contractor shall give the Consultant timely notice of its readiness for such testing or inspection or, if the same is to be performed by a governmental authority, of the date fixed therefor. If any such work, without the written permission of the Consultant, should be covered up prior to such testing or inspection, the Contractor, at its sole cost and expense must, if directed by the Consultant, uncover the same for testing or inspection and reconstruct same after the tests or inspection are conducted. All certificates of inspection or testing, involving the Contractor's work, required to be obtained from governmental authorities are to be secured by the Contractor at its sole cost and expense.
- (5) Should it be considered necessary or advisable by the Consultant at any time before final acceptance of the entire work to make an examination of work already completed by removing or tearing out same, the Contractor, upon request, shall furnish all necessary facilities, labor and material to perform such examination. If the work subject to such examination is found to be defective or nonconforming in any manner due to the fault of the Contractor or any of its subcontractors, such uncovering or destruction and necessary reconstruction, even though such includes work not covered in the Contract, shall be at the expense of the Contractor. If, however, such work after testing and examination is found to be satisfactory, the University will pay the Contractor the cost of such uncovering or destruction and reconstruction, such cost to be determined as in the case of extra work as provided in Sections 4.02 and 4.05A.
- (6) Inspection of material and furnished articles to be incorporated in the work may be made at the place of production, manufacture or shipment unless otherwise stated herein. The inspection of material and workmanship for final acceptance as a whole or in part will be made at the site of the work.

**Section 2.18 Subcontractors**

- (1) Except for subcontractors designated by the University, or required to be named at any earlier date, pursuant to the provisions of the Information for Bidders, within thirty (30) calendar days after receipt of the notice to proceed, the Contractor must submit a written statement to the Consultant giving the name and address of all proposed subcontractors. Said statement must contain a description of the portion of the work and materials which the proposed subcontractors are to perform and furnish and any other information tending to prove that the proposed subcontractors have the necessary facilities, skill, integrity, past experience and financial resources to perform the work in accordance with the terms and provisions of the Contract Documents.
- (2) If the Consultant finds that the proposed subcontractors are qualified, it will so notify the Contractor within ten (10) working days after receipt of the aforesaid information. If the determination is to the contrary, however, the Consultant within such period will notify the Contractor of such determination and the latter, unless it decides to do such work itself and is qualified, in the Consultant's opinion, to do such work, must, within ten (10) working days thereafter, submit similar information with respect to other proposed subcontractors.
- (3) The Consultant's approval of a subcontractor and/or the University's designation of a subcontractor pursuant to the provisions of the Contract Documents shall not relieve the Contractor of any of its responsibilities, duties and liabilities hereunder. The Contractor shall be solely responsible to the University for the acts or defaults of such subcontractors and of such subcontractors' officers, agents and employees, each of whom shall, for this purpose, be deemed to be the agent or employee of the Contractor to the extent of its subcontract.
- (4) The Contractor shall be fully responsible for the administration, integration, coordination, direction and supervision of all of its subcontractors and of all work and it shall check all space requirements of the work and coordinate and adjust the same so that conflicts in space do not occur in the work being performed by it with its own employees and with the work being performed by its subcontractors and so that all equipment, piping, wiring, etc., can be installed, where possible, in the spaces allowed for same.

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- (5) No subcontractor shall be permitted to work at the site until: (a) it has furnished satisfactory evidence to the Consultant of the insurance required by law; (b) in the case of a Project involving a federal grant, it has furnished satisfactory evidence to the Consultant of the same type and amount of liability insurance as that required of the Contractor by Section 5.06 of the Agreement; and (c) except for subcontractors designated by the University pursuant to the provisions of the Information for Bidders, it has been approved by the Consultant.
- (6) Within ten (10) working days after the Contractor receives payment from the University on account of a progress payment application for the percentage of the work done, it shall pay each of its subcontractors the sum contained in said payment for the percentage of said subcontractor's work, less the same amount retained therefrom by the University under the terms of the Contract Documents or in consequence of any legal proceedings or statutory liens, and less any amounts due the Contractor under the subcontract for work not performed or not properly or timely performed by the subcontractor. In the event any subcontractor is not paid by the Contractor, the former should immediately notify the University of such fact.
- (7) The Contractor shall execute with each of its subcontractors and shall require all subcontractors to execute with their sub-subcontractors a written agreement which shall bind the latter to the terms and provisions of this Agreement insofar as such terms and provisions are applicable to the work to be performed by such subcontractors. The Contractor shall require all subcontractors and sub-subcontractors to promptly, upon request, file with the Consultant and the University a conformed copy of such agreements, from which the price and terms of payment may be deleted.
- (8) If for sufficient reason, at any time during the progress of the work to be performed hereunder, the Consultant determines that any subcontractor or sub-subcontractor is incompetent, careless, or uncooperative, the Consultant will notify the Contractor accordingly and immediate steps will be taken by the Contractor for cancellation of such subcontract or sub-subcontract. Such termination, however, shall not give rise to any claim by the Contractor or by such subcontractor or sub-subcontractor for loss of prospective profits on work unperformed and/or work unfurnished and a provision to that effect shall be contained in all subcontracts and sub-subcontracts.
- (9) No provisions of this Agreement shall create or be construed as creating any contractual relation between the University and any subcontractor or sub-subcontractor or with any person, firm or corporation employed by, contracted with or whose services are utilized by the Contractor.

**Section 2.19 Shop Drawings and Samples**

- (1) The Contractor in accordance with the approved Shop Drawing, Submittal, Mockup, and Sample schedules and with such promptness and in such sequence as to cause no delay in the work, shall submit for the Consultant's approval all Shop Drawings and Samples called for under the Contract or requested by the Consultant.
- (2) Shop Drawings and mock-ups shall establish the actual detail of the work, indicate proper relation to adjoining work, amplify design details of mechanical and electrical equipment in proper relation to physical spaces in the structure, and incorporate minor changes of design or construction to suit actual conditions. Shop drawings include drawings, diagrams, schedules, product data and other information or materials specially prepared for the work by the Contractor to illustrate some portion of the work. Product data include standard illustrations, schedules, performance charts, instructions, brochures, diagrams and other information identified by the Contractor to illustrate materials or equipment for some portion of the work.
- (3) All Shop Drawings, mock-ups and samples shall be thoroughly checked by the Contractor for compliance with the Contract Documents before submitting them to the Consultant for approval and all Shop Drawings shall bear the Contractor's recommendation for approval. Any Shop Drawings submitted without this stamp of approval and certification, and Shop Drawings which, in the Consultant's opinion, are incomplete, contain numerous errors or have not been checked or only checked superficially, will be returned unchecked by the Consultant for resubmission by the Contractor. In checking Shop Drawings, the Contractor shall verify all dimensions and field conditions and shall check and coordinate the Shop Drawings of any section or trade with the requirements of all other sections or trades whose work is related thereto, as required for proper and complete installation and sequence of the work.

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- (4) Samples must be of sufficient size or number to show the quality, type, range of color, finish and texture of the material. Each Sample shall be properly labeled to show the nature of the material, trade name of manufacturer, name and location of the work where the material represented by the Sample is to be used and the name of the Contractor submitting the Sample. Transportation charges to the Consultant must be prepaid on Samples forwarded to it.
- (5) At the start of the Project, the format for submittals shall be established by the University. If an electronic method is selected for the submission and approval of submittals, the Contractor shall provide submittals in a PDF format and the Consultant will return the submittals in electronic format to the Contractor. For both hard-copy and electronic submittal formats, all submittals that require physical samples or mock-ups shall be provided in accordance with the requirements set forth in the Contract Specifications. Shop Drawings and Samples, submitted by the Contractor in accordance with the approved Shop Drawing and Sample schedule that is included in the Time Progress Schedule, will be reviewed by the Consultant within fifteen (15) working days and if satisfactory will be approved. A Shop Drawing, when approved, will be returned to the Contractor. If not satisfactory, the Drawings and Samples will be appropriately marked and returned to the Contractor for correction thereof, in which event the Contractor shall resubmit to the Consultant a corrected copy of the Shop Drawing or a new Sample, as the case may be. The Contractor shall make any correction required by the Consultant and shall appropriately note any changes or revisions on the Shop Drawing, dated to correspond with the date of the Consultant's request for the change. Upon approval of the Shop Drawing by the Consultant, the Contractor shall promptly furnish to the Consultant as many copies thereof as the Consultant may reasonably request. Should more than two (2) separate reviews of any required shop drawings or samples submitted be necessary, in the judgement of the Consultant and the University, the Contractor shall be responsible for the reasonable costs incurred by the University for such additional reviews by the Consultant.
- (6) At the time of submission of a Shop Drawing or Sample, the Contractor shall inform the Consultant and the University in writing of any deviation in the Shop Drawing or Sample from the requirements of the Contract Documents. Unless such deviation is specifically noted by the Contractor with a notation that such deviation will result in extra work for which the Contractor requests payment, the Contractor shall be deemed to have waived any claim for extra work, additional compensation or payment or an extension of time with respect to all work shown on, described in or related to the Shop Drawing or Sample.
- (7) The Consultant's approval of Shop Drawings or Samples is for design only and is not a complete check on the method of assembly, erection or construction. Approval shall in no way be construed as: (a) permitting any departure whatsoever from the Contract Documents, except where the Contractor, in accordance with the provisions of paragraph 6 of this Section, has previously notified the University and the Consultant of such departure; (b) relieving the Contractor of full responsibility for any error in quality of materials, details, dimensions, omissions or otherwise that may exist; (c) relieving the Contractor of full responsibility for adequate field connections, erection techniques, bracing or deficiencies in strength; (d) relieving the Contractor of full responsibility for satisfactory performance of all work and coordination with the work of all subcontractors and other contractors; or (e) permitting departure from additional details or instructions previously furnished by the Consultant.
- (8) No work requiring a Shop Drawing or Sample shall be commenced until a Shop Drawing or Sample is approved by the Consultant and all such work shall be: (a) in accordance with the approved Shop Drawing, provided the latter conforms in all respects to the Contract Documents or to such deviations therefrom as have been previously noted by the Contractor in accordance with the provisions of paragraph 6 of this Section; and (b) in conformance in all respects to the sample furnished to and approved by the Consultant and, unless otherwise specified, as new and of good quality.
- (9) The Contractor may be required to provide professional services that constitute the practice of architecture or engineering when specifically required by the Contract Documents for a portion of the work or the Contractor needs to provide such services in order to carry out its responsibilities for construction means, methods, techniques, sequences and procedures. When professional services are required in the Contract Documents, the Consultant will specify all performance and design criteria that such services must satisfy. The University and Consultant shall be entitled to rely on the adequacy, accuracy and completeness of the professional services, certifications, and approvals performed or provided by design professionals working for the Contractor.



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- (10) Contractor agrees that the University may deduct from any application for payment made by the Contractor, any and all Design Professional, Consultant and/or Construction Management fees and costs incurred by the University together with a markup upon such hard costs in the amount of 15% in the review or evaluation of any substitutions for methods, products or performance pursuant to this Section 2.19.

**Section 2.20 Equivalents - Approved Equal**

(1) Equivalents or Approvals - General

- a. The words "similar and equal to", or equal", "equivalent" and such other words of similar content and meaning shall for the purposes of this Agreement be deemed to mean similar and equivalent to one of the named products. For the purposes of subdivisions (1) and (2) of this Section and for the purposes of the Bidding Documents, the word "products" shall be deemed to include the words "articles", "materials", "items", "equipment" and "methods". Whenever in the Contract Documents one or more products are specified, the words "similar and equal to" shall be deemed inserted.
- b. Whenever any product is specified in the Contract Documents by a reference to the name, trade name, make or catalog number of any manufacturer or supplier, the intent is not to limit competition, but to establish a standard of quality which the Consultant has determined is necessary for the Project. A Contractor may at its option use any product other than that specified in the Contract Documents provided the same is approved by the Consultant in accordance with the procedures set forth in subdivision (2) of this Section. In all cases the Consultant shall be the sole judge as to whether a proposed product is to be approved and the Contractor shall have the burden of proving, at its own cost and expense, to the satisfaction of the Consultant, that the proposed product is similar and equal to the named product. In making such determination the Consultant may establish such objective and appearance criteria as it may deem proper that the proposed product must meet in order for it to be approved.
- c. Nothing in the Contract Documents shall be construed as representing, expressly or implied, that the named product is available or that there is or there is not a product similar and equal to any of the named products and the Contractor shall have and make no claim by reason of the availability or lack of availability of the named product or of a product similar and equal to any named product.
- d. The Contractor shall have and make no claim for an extension of time or for damages by reason of the time taken by the Consultant in considering a product proposed by the Contractor or by reason of the failure of the Consultant to approve a product proposed by the Contractor.
- e. Requests for approval of proposed equivalents will be received by the Consultant only from the Contractor.
- f. Approval shall in no way be construed as: (a) permitting any departure whatsoever from the Contract Documents, (b) relieving the Contractor of full responsibility for any error in quality of materials, details, dimensions, sequence of work, omissions or otherwise that may exist, (c) relieving the Contractor of full responsibility for adequate field connections, erection techniques, bracing or deficiencies in strength, (d) relieving the Contractor of full responsibility for satisfactory performance of all work to achieve a functionally complete facility or result and coordination with the work of all subcontractors and other contractors or (e) permitting departure from additional details or instructions previously furnished by the Consultant.
- g. Contractor agrees that the Contractor approves and authorizes the deduction from Contractor's applications for payment any and all costs incurred by the Construction Manager, Consultant, Design Professional or otherwise in evaluating Contractor's submissions under this Section 2.20, together with a markup upon such hard costs in the amount of 15%.

(2) Equivalents or Approvals After Bidding

- a. Any and all submissions for "or equal" products which are submitted by the Contractor after award of the Contract must be made by the Contractor within ninety (90) calendar days after the date of award. Contractor agrees that it waives and relinquishes the right, claim or privilege, if any, to submit "or equal" proposals if such are made ninety (90) calendar days after the date of award of the Contract to the Contractor.
- b. Requests for approval of proposed equivalents will be considered by the Consultant after bidding only in the

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following cases: (a) the named product cannot be obtained by the Contractor because of strikes, lockouts, bankruptcies or discontinuance of manufacture and the Contractor makes a written request to the Consultant for consideration of the proposed equivalent within ten (10) calendar days of the date it ascertains it cannot obtain the named product; or (b) the proposed equivalent is superior, in the opinion of the Consultant, to the named product; or (c) the proposed equivalent, in the opinion of the Consultant, is equal to the named product and its use is to the advantage of the University, e.g., the University receives an equitable credit, acceptable to it, as a result of the estimated cost savings to the Contractor from the use of the proposed equivalent or the University determines that the Contractor has not failed to act diligently in placing the necessary purchase orders and a savings in the time required for the completion of the construction of the Project should result from the use of the proposed equivalent.

- c. Where the Consultant pursuant to the provisions of this subdivision approves a product proposed by a Contractor and such proposed product requires a revision or redesign of any part of the work covered by this Agreement, all such revision and redesign and all new Drawings and details required therefor shall be subject to the approval of the Consultant and shall be provided by the Contractor at its own cost and expense.

Where the Consultant pursuant to the provisions of this Section approves a product proposed by a Contractor and such proposed product requires a different quantity and/or arrangement of duct work, piping, wiring, conduit or any other part of the work from that specified, detailed or indicated in the Contract Documents, the Contractor shall provide the same at its own cost and expense.

- (3) Contractor agrees that the University may deduct from any application for payment made by the Contractor any and all Design Professional, Consultant and/or Construction Management fees and costs incurred by the University, together with a markup upon such hard costs in the amount of 15%, in the consideration or evaluation of any substitutions for methods, products or performance pursuant to this Section 2.20.

**Section 2.21 Patents, Trademarks and Copyrights**

The Contractor acknowledges that the Contract consideration includes all royalties, license fees and costs arising from patents or trademarks in any way involved in the work; provided, however, that the Contract consideration shall not be deemed to have included therein any royalty, license fee or cost arising from a patent or trademark for a design prepared by the Consultant and neither the Contractor nor the University shall have any liability in connection therewith. Where the Contractor is required or desires to use any product, device, material or process covered by patent or trademark, the Contractor shall indemnify and save harmless the University and the State of New York from any and all claims, actions, causes of action or demands, for infringement by reason of the use of such patented product, device, material or process, and shall indemnify the University and the State of New York from any cost, liability, damage and expense, including reasonable attorneys' fees and court costs, which it may be obligated to incur or pay by reason of any claim or infringement at any time both before or after the University's final acceptance of all the work to be performed under the Contract.

**Section 2.22 Possession Prior to Completion**

If before the final completion of all the work it shall be deemed advisable or necessary by the University to take over, use, occupy or operate any part of the completed or partly completed work or to place or install therein equipment and furnishings, the University, upon reasonable written notice to the Contractor, shall have the right to do so and the Contractor will not in any way interfere therewith or object to the same. Such action by the University shall in no way affect the obligations of the Contractor under the terms and provisions of the Contract Documents and the Contractor acknowledges that such action by the University does not in any way evidence the completion of the work or any part thereof or in any way signify the University's acceptance of the work or any part thereof. The Contractor agrees to continue the performance of all work covered by the Contract in a manner which will not unreasonably interfere with such takeover, use, occupancy, operation, placement or installation.

**Section 2.23 Completion and Acceptance**

(1) Partial Completion

If before the final completion of all the work any portion of the permanent construction has been satisfactorily completed and the same will be immediately useful to the University, the latter may, by written notice, advise the Contractor that it accepts such portion of the work. Such action by the University shall in no way affect the obligations of the Contractor under the terms and provisions of the Contract with respect to any work not so completed and accepted. The partial completion of any portion of the Contractor's work by the University, the

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Campus or the Consultant, shall not impact the assessment of liquidated damages or actual costs for delays or disruption to the Project caused by the Contractor, its subcontractors or vendors.

(2) Substantial Completion

When all the Work covered by the Contract is substantially completed, as defined in Section 1.01, the Contractor shall give written notice thereof to the University and the Consultant. The latter will then promptly make an inspection of the work and, if they shall determine that all the work is substantially completed, they shall so advise the Contractor. Such action shall in no way affect the obligations of the Contractor under the terms and provisions of the Contract with respect to any uncompleted (including untested or deferred work), unaccepted or corrective work or in any way affect, limit or preclude the issuance by the Consultant, from time to time thereafter, of "Punch Lists", i.e., lists of uncompleted or corrective work which the Contractor is to promptly complete and/or correct. In the judgement of the University, should more than two (2) separate inspections of the Work be necessary, the Contractor agrees that the University may deduct from any application for payment made by the Contractor, any and all Design Professional, Consultant and/or Construction Management fees and costs incurred by the University together with a markup upon such hard costs in the amount of 15% for all such additional inspections.

The Contractor must fully, completely and acceptably perform all Punch List work and any other work subsequently discovered remaining to be completed or corrected, within ninety (90) calendar days of Substantial Completion or within such other timeframe stipulated by the University or Consultant. Failure to complete the Punch List within the time so designated hereunder may be deemed default on the part of the Contractor.

(3) Final Completion and Acceptance

After the completion of all the work the Contractor shall give written notice to the University and the Consultant that all the work is ready for inspection and final acceptance. The University and the Consultant shall promptly make such inspection and, if they shall determine that all the work has been satisfactorily completed, the University shall thereupon by written notice advise the Contractor that it accepts such work. In the judgement of the University, should more than two (2) separate inspections of the Work be necessary, the Contractor agrees that the University may deduct from any application for payment made by the Contractor, any and all Design Professional, Consultant and/or Construction Management fees and costs incurred by the University together with a markup upon such hard costs in the amount of 15% for all such additional inspections.

**Section 2.24 Record Drawings**

- (1) At the start of the Project, the format for Record Drawings shall be established by the University. Prior to acceptance by the University of all work covered by the Contract, the Contractor shall furnish to the Consultant one (1) set of current Contract Drawings on which the Contractor has recorded, using colored pencil for hard copy format or electronic editing tool in contrasting color for electronic format, in a neat and workmanlike manner, all instances where actual field construction differs from work as indicated on the Contract Drawings. These "Record" Drawings shall show the following information: (a) all significant changes in plans, sections, elevations and details, such as shifts in location of walls, doors, windows, stairs and the like made during construction; (b) all significant changes in foundations, columns, beams, openings, concrete reinforcing, lintels, concealed anchorages and "knock-out" panels made during construction; (c) final location of electric panels, final arrangement of electric circuits and any significant changes made in electrical design as a result of Change Orders, Field Orders or job conditions; (d) final location and arrangement of all mechanical equipment and major concealed plumbing, including, but not limited to, supply and circulating mains, vent stacks, sanitary and storm water drainage; (e) final location and arrangement of all underground utilities, connections to building and/or rerouting of existing utilities, including, but not limited to, sanitary, storm, heating, electric, signal, gas, water and telephone; and (f) final make and model for all significant equipment and devices listed in the specifications. The Contractor shall also provide an electronic version as determined by the Consultant.
- (2) Periodically during the work, the Consultant may request submission of a progress set of Record Drawings for review and advise the Contractor of errors or omissions, if any, that must be corrected or completed prior to final submission of the Record Drawings. Shop Drawings shall not be acceptable as Record Drawings.
- (3) The Contractor shall submit the Record Drawings to the Consultant at least fifteen (15) days prior to the date of Substantial Completion. The Consultant will then review the Record Drawings and, if they shall determine that the Record Drawings represent the actual field construction being completed, they shall so advise the

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Contractor. If not satisfactory, the Record Drawings will be appropriately marked and returned to the Contractor for correction thereof, in which event the Contractor shall promptly correct and resubmit to the Consultant a corrected copy of the Record Drawings. Acceptance of the Record Drawings by the University is a condition precedent to the Contractor's entitlement to receive Final Payment.

**Section 2.25 Guarantees**

- (1) The Contractor, at the convenience of the University, shall remove, replace and/or repair at its own cost and expense any defects in workmanship, materials, ratings, capacities or characteristics occurring in or to the work covered by the Contract within one (1) year or within such longer period as may otherwise be provided in the Contract, the period of such guarantee to commence with the University's final acceptance of all work covered under the Contract or at such other date or dates as the University may specify prior to that time, and the Contractor, upon demand, shall pay for all damage to all other work resulting from such defects and all expenses necessary to remove, replace and/or repair such other work which may be damaged in removing, replacing or repairing the said defects. The obligations of the Contractor under the provisions of this paragraph or any other guarantee provisions of the Contract Documents are not limited to the monies retained by the University under the Contract.
- (2) Unless such removal, replacement and/or repair shall be performed by the Contractor within ten (10) working days after it receives written notice from the University specifying such defect, or if such defect is of such a nature that it cannot be completely removed, repaired and/or replaced within said ten (10) day period and the Contractor shall not have diligently commenced removing, repairing and/or replacing such defect within said ten (10) day period and shall not thereafter with reasonable diligence and in good faith proceed to do such work, the University may employ such other person, firm or corporation as it may choose to perform such removal, replacement and/or repair and the Contractor agrees, upon demand, to pay to the University all amounts which it expends for such work.

**Section 2.26 Default of Contractor**

- (1) In addition to those instances specifically referred to in other Sections hereof, the University shall have the right to declare the Contractor in default of the whole or any part of the work if:
  - a. The Contractor becomes insolvent; or if
  - b. The Contractor makes an assignment for the benefit of creditors pursuant to the statutes of the State of New York; or if
  - c. A voluntary or involuntary petition in bankruptcy is filed by or against the Contractor; or if
  - d. A receiver or receivers are appointed to take charge of the Contractor's property or affairs; or if
  - e. The Contractor fails to commence work when notified to do so by the Consultant; or if
  - f. The Contractor shall abandon the work; or if
  - g. The Contractor shall refuse to proceed with the work or extra work when and as directed by the Consultant or the University; or if
  - h. The Contractor shall without just cause reduce its working force to a number which, if maintained, would be insufficient, in the opinion of the University, to complete the work in accordance with the approved time progress schedule, and shall fail or refuse to sufficiently increase such working force when ordered to do so by the Consultant; or if
  - i. The Contractor shall sublet, assign, transfer convey, or otherwise dispose of the Contract other than as herein specified; or if
  - j. The University shall be of the opinion that the Contractor is or has been unnecessarily or unreasonably or willfully delaying the performance and completion of the work, or the award of necessary subcontracts, or the placing of necessary material and equipment orders; or if



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- k. The University shall be of the opinion that the work cannot be completed within the time herein provided therefor or within the time to which such completion may have been extended; provided, however, that the impossibility of timely completion is, in the University's opinion, attributable to conditions within the Contractor's control; or if
  - l. The work is not completed within the time herein provided therefor or within the time to which the Contractor may be entitled to have such completion extended; or if
  - m. The University shall be of the opinion that the Contractor is or has been willfully or in bad faith violating any of the provisions of this Agreement;
  - n. The University shall be of the opinion that the Contractor is not or has not been executing the Contract in good faith and in accordance with its terms; or if
  - o. At any time during the period of the Agreement, insurance as required is not in effect or proof thereof is not provided to the University.
- (2) Before the University shall exercise its right to declare the Contractor in default by reason of the conditions set forth in the above items a, b, c, d, e, f, g, h, i, j, k, l, m, n and o, it shall give the Contractor three (3) working days' notice of its intention to declare the Contractor in default and unless, within such three (3) day period, the Contractor shall make arrangements, satisfactory to the University, to correct and/or eliminate the conditions set forth in the University's aforesaid notice, the Contractor may be declared in default at the expiration of such three (3) day period or at the expiration of such longer period of time as the University may determine.
- (3) The right to declare in default for any of the grounds specified or referred to shall be exercised by the University sending the Contractor a written notice setting forth the ground or grounds upon which such default is declared. Upon receipt of notice that it has been declared in default, the Contractor shall immediately discontinue all further operations under the Contract and shall immediately quit the site, leaving untouched all plant, materials, equipment, tools and supplies then on site.
- (4) The University, after declaring the Contractor in default, may then have the work completed by such means and in such manner, by contract, with or without public letting, or otherwise, as it may deem advisable, utilizing for such purpose such of the Contractor's plant, materials, equipment, tools and supplies remaining on the site, and also such subcontractors as it may deem advisable, or it may call upon the Contractor's surety at its own expense to do so.
- (5) In the event that the University declared the Contractor in default of the work or any part of the work, the Contractor, in addition to any other liability to the University hereunder or otherwise provided for or allowed by law, shall be liable to the University for any costs it incurs for additional architectural and engineering services necessary, in its opinion, because of the default and the total amount of liquidated damages from the date when the work should have been completed by the Contractor in accordance with the terms hereof to the date of actual completion of the work, both of which items shall be considered as expenses incurred by the University in completing the work and the amount of which may be charged against and deducted out of such monies as would have been payable to the Contractor or its surety if the work had been completed without a default.
- (6) If the University completes the work, the Consultant shall issue a certificate stating the expenses incurred in such completion, including the cost of re-letting. Such certificate shall be final, binding and conclusive upon the Contractor, its surety, and any person claiming under or through the Contractor, as to the amount thereof.
- (7) The expense of such completion, as so certified by the Consultant, shall be charged against and deducted out of such monies as would have been payable to the Contractor if it had completed the work; the balance of such monies, if any, subject to the other provisions of the Contract, to be paid to the Contractor without interest after such completion. Should the expense of such completion, so certified by the Consultant, exceed the total sum which would have been payable under the Contract if the same had been completed by the Contractor, any such excess shall be paid by the Contractor to the University upon demand.

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- (8) In the event the University shall determine to complete the work without calling upon the Contractor's surety to do so, the Contractor shall not be entitled, from and after the effective date of the declaration of the default, to receive any further payment under the Contract until the said work shall be wholly completed and accepted by the University.
- (9) In case the University shall declare the Contractor in default as to a part of the work only, the Contractor shall discontinue such part, shall continue performing the remainder of the work in strict conformity with the terms of the Contract, and shall in no way hinder or interfere with any other contractors or persons whom the University may engage to complete the work as to which the Contractor was declared in default.
- (10) The provisions relating to declaring the Contractor in default as to the entire work shall be equally applicable to a declaration of partial default, except that the University shall be entitled to utilize for completion of the part of the work as to which the Contractor was declared in default only such plant, materials, equipment, tools and supplies as had been previously used by the Contractor on such part.
- (11) In completing the whole or any part of the work, the Consultant and the University shall have the power to depart from, change or vary the terms and provisions of the Contract; provided, however, that such departure, change or variation is made for the purpose of reducing the time or expense of such completion. Such departure, change or variations, even to the extent of accepting a lesser or different performance, shall not affect the conclusiveness of the Consultant's certificate of the cost of completion, nor shall it constitute a defense to any action to recover the amount by which such certificate exceeds the amount which would have been payable to the Contractor hereunder but for its default.
- (12) The provisions of this Section shall be in addition to any and all other legal or equitable remedies provided by this Agreement and otherwise applicable by law.

**Section 2.27 Termination for Convenience**

- (1) The performance of work under this Agreement may be terminated by the University, in whole or in part, whenever the University shall determine that such termination is in the best interest of the University. Any such termination shall be effected by a notice in writing to the Contractor specifying the date upon which such termination shall become effective and the extent to which performance of the Contract shall be terminated. Such termination shall be effective on the date and to the extent specified in said notice.
- (2) Upon receipt of a notice of termination, and-except as otherwise directed in writing by the University, the Contractor shall:
  - a. Discontinue all work and the placing of all orders for materials and facilities otherwise required for the performance thereof,
  - b. Cancel all existing orders and subcontracts to the extent such orders and subcontracts relate to the performance of work terminated by the notice of termination;
  - c. Take such action as may be necessary to secure to the University the benefits of any rights of the Contractor under orders or subcontracts which relate to the performance of work terminated by the notice of termination, including, but not limited to, the assignment to the University, in the manner and to the extent directed by the University, all the right, title and interest of the Contractor under the orders or subcontracts so terminated and cancelled. In the event of such assignment, the University shall have the right, in its discretion, to settle or pay any or all claims arising out of the termination and cancellation of such orders and subcontracts;
  - d. Transfer title and deliver to the University, in accordance with the direction of the University, all materials, supplies, work in process, facilities, equipment, machines or tools produced as a part of or acquired by the Contractor in connection with the work terminated by said notice, and all plans, Drawings, Working Drawings, sketches, Specifications and information for use in connection therewith; provided, however, that the Contractor may retain any of the foregoing if it so elects and foregoes reimbursement therefor;
  - e. Take such action as may be necessary or as the Consultant or the University may prescribe for the protection and preservation of all property in the possession or control of the Contractor in which the University, under the provisions of the Contract, has or may acquire an interest.

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- (3) Notwithstanding the foregoing, should the notice of termination relate to only a portion of the work covered by the Contract, the Contractor will proceed with the completion of such portions of the work as are not terminated.
- (4) The University will pay and the Contractor shall accept, in full consideration for the performance and completion of the portions of the work as are not terminated, a sum calculated by determining the percentage the portions of the work not terminated bear to the total amount of the work covered by the Contract, and by multiplying the Contract consideration by such percentage - the product thereof being the amount to be paid to the Contractor. The University shall determine the amount of such consideration in accordance with the foregoing.
- (5) Upon compliance by the Contractor with the foregoing provisions of this Section and subject to deductions for payments previously made, the University, for the portions of the work terminated, shall compensate the Contractor as follows:
- a. By reimbursing the Contractor for actual expenditures made with respect to such work, including expenditures made in connection with any portion thereof which may have been completed prior to termination, as well as expenditures made after termination in completing those portions of the work covered by the Contract which the Contractor may have been required by the notice of termination to complete. The University shall determine the allowability and amount of such expenditures.
  - b. By reimbursing the Contractor for all actual expenditures made, with the prior written approval of the University or pursuant to a court judgment, in settling or discharging any outstanding contractual obligations or commitments incurred or entered into by the Contractor in good faith with respect to the Contract and resulting from the termination thereof.
  - c. By reimbursing the Contractor for all actual expenditures made after the effective date of the notice of termination resulting from or caused by the Contractor taking necessary action or action prescribed by the Consultant or the University for the protection and preservation of all property in the possession or control of the Contractor in which the University, under the provisions of the Contract, has or may acquire an interest.
  - d. By paying the Contractor a markup, which is to be calculated in the same manner as that provided for in subdivision c of paragraph (1) of Sections 4.02 and 4.05A for extra work, on the foregoing expenditures, which markup is to cover the Contractor's overhead and profit; provided, however, that if it appears that the Contractor would have sustained a loss on the entire Contract had it been completed, said markup shall be reduced by one-third.
- (6) The sum of all amounts payable under this Section, plus the sum of all amounts previously paid by the University under the provisions of the Contract, shall not exceed the amount of the Contract consideration. In no event shall the Contractor be entitled to any payment for loss of anticipated profits on uncompleted work and the University shall not be liable for same.
- (7) Termination by the University under the provisions of this Section shall be without prejudice to any claims or rights which the University may have against the Contractor. The University may retain from the amount due to the Contractor under the provisions of this Section such monies as may be necessary to satisfy any claim which the University may have against the Contractor in connection with the Contract; provided, however, that the University's failure to retain such monies shall not be deemed a waiver of any of its rights or claims against the Contractor.
- (8) Notwithstanding the foregoing, where the Contractor and the Consultant can agree upon another method of determining the amount of the consideration to be paid to the Contractor under the provisions of this Section, such method, subject to the approval of the University, may, at the option of the University, be substituted for the method set forth above.

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**Article III**  
**Time of Performance**

**Section 3.01 Commencement, Prosecution and Completion of Work**

- (1) The Contractor agrees that it will begin the work herein embraced upon receipt of notice to proceed, unless the University consents in writing, to begin at a different date, and that it will prosecute the same with such diligence that all work covered by the Contract shall be substantially completed and performed on or before the time specified on page one of the Agreement.
- (2) The Contractor further agrees that time is of the essence in this Agreement and that all the work shall be prosecuted in such manner and with sufficient plant and forces to complete all work timely.

**Section 3.02 Time Progress Schedule**

- (1) To show compliance with the requirements of Section 3.01 of the Agreement, provide and maintain a Time Progress Schedule in accordance with the General Requirements, Special Conditions, Section paragraph titled "Project Schedule". Unless otherwise accepted by the University, the Time Progress Schedule shall be strictly adhered to by the Contractor. The time for substantial completion shall be on or before the time specified on page one of the Agreement.
- (2) If through the fault of the Contractor or any subcontractor the Contractor shall fail to adhere to the time progress schedule, it must promptly adopt such other and additional means and methods of construction as will make up for the time lost and will assure completion in accordance with such schedule.
- (3) The failure of the Contractor to submit a Time Progress Schedule, the University's or the Consultant's acceptance of the Contractor's time progress schedule or lack of such acceptance, the means and/or methods of construction employed by the Contractor, including any revisions thereof, and/or its failure to revise the same shall not relieve the Contractor of its obligation to accomplish the result required by the Contract in the time specified on page one of the Agreement, nor shall the exercise of the Consultant's or the University's right to reject any portion of the work, create or give rise to any claim, action or cause of action, legal, equitable or otherwise, against the Consultant or the University.
- 4) The failure of the Contractor to submit and maintain a Time Progress Schedule in accordance with the General Requirements shall be deemed to be a waiver by the Contractor of all claims for additional compensation or damages as a result of any condition which is an alleged cause of delay in the completion of the work.

**Section 3.03 Time Progress Schedule for Shop Drawings and Samples**

The Contractor shall include activities for preparation and submission of all Shop Drawings, mock-ups and Samples in the Time Progress Schedule in Section 3.02.

**Section 3.04 Notice of Conditions Causing Delay**

- (1) Within ten (10) working days after the commencement of any condition which is causing or may cause delay in completion or require Contractor to request an extension of time, the Contractor must notify the Consultant and the University in writing of the effect, if any, of such condition upon the Time Progress Schedule, and must state why and in what respects, if any, the condition is causing or may cause such delay.
- (2) Contractor agrees that an express condition precedent to Contractor's entitlement to any extension of time on the project shall be full and complete compliance to the satisfaction of the University with the Contractor's obligations in Section 3.06, Contractor's Progress Reports. Failure to submit proper Contractor's progress reports in appropriate and timely fashion shall be deemed a waiver and relinquishment of any right, claim or privilege to obtain an extension of time for the performance of the Contractor's work.
- (3) Failure to strictly comply with this requirement may, in the discretion of the University, be deemed sufficient cause to deny any extension of time on account of delay in completion arising out of or resulting from any change, extra work, suspension, or other condition.
- (4) Except as otherwise set forth in this Section 3.04 all procedures set forth in Sections 2.02 and 2.03 of this Agreement shall be complied with by the Contractor. Furthermore, full and complete compliance with the

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requirements of this Article III is a condition precedent to the Contractor's entitlement to receive an extension of time.

**Section 3.05 Extension of Time**

- (1) Within ten (10) working days after the commencement of any condition which is causing or may cause the Contractor to incur, require or otherwise need an extension of time, the Contractor shall notify the Consultant and the University of such condition. Full and complete compliance with this paragraph 3.05(1) is a condition precedent to the Contractor obtaining an extension of time for performance of any portion or all of its work.
- (2) An extension or extensions of time for the completion of the work may be granted by the University subject to the provisions of this Section, but only upon written application therefor by the Contractor to the University and the Consultant.
- (3) An application for an extension of time must set forth in detail the source and the nature of each alleged cause of delay in the completion of the work, the date upon which each such cause of delay began and ended and the number of days of delay attributable to each of such causes. It must be submitted prior to completion of the work.
- (4) If such an application is made, the Contractor may be entitled to an extension of time for delay in completion of the work caused solely: (a) by the acts or omissions of the University, its trustees, officers, agents or employees; or (b) by the acts or omissions of other contractors, not including subcontractors of the Contractor, on this Project; or (c) by unforeseeable supervening conditions entirely beyond the control of either party hereto (such as, but not limited to, acts of God or the public enemy, war or other national emergency making performance temporarily impossible or illegal, or strikes or labor disputes).
- (5) The Contractor may, however, be entitled to an extension of time for such causes only for the number of calendar days of delay which the University may determine to be due solely to such causes, and then only if the Contractor shall have strictly complied with all of the requirements of this Section and Section 3.04. The University shall make such determination within ninety (90) calendar days after receipt of the Contractor's application for an extension of time; provided, however, said application complies with the requirements of this Section.
- (6) The Contractor shall not be entitled to receive a separate extension of time for each one of several causes of delay operating concurrently, but, if at all, only for the actual period of delay in completion of the work as determined by the University, irrespective of the number of causes contributing to produce such delay. If one of several causes of delay operating concurrently results from any act, fault or omission of the Contractor or of its subcontractors or material-men and would of itself (irrespective of the concurrent causes) have delayed the work, no extension of time will be allowed for the period of delay resulting from such an act, fault or omission.
- (7) The granting of an application for an extension of time for causes of delay other than those herein referred to shall be entirely within the discretion of the University.
- (8) If the Contractor shall claim to have sustained any damages by reason of delays, extraordinary or otherwise, or hindrances which it claims to be due to any action, omission, direction or order by the University or the Consultant, the Contractor shall be entitled only to an extension of time as hereinabove provided and shall not have or assert any claim or prosecute any suit, action, cause of action or proceeding against the University based upon such delays or hindrances, unless such delays or hindrances were caused by the University's bad faith or its willful, malicious, or grossly negligent conduct, or un contemplated delays, or delays so unreasonable that they constitute an intentional abandonment of the Contract by the University, or delays resulting from the University's breach of a fundamental obligation of the Contract.
- (9) The Contractor shall not be entitled to an extension of time for the performance of any or all of the Work set forth in allowances to the Contract. All allowance work shall be performed in accordance with the Contractor's schedule.

**Section 3.06 Contractor's Progress Reports**

After commencement of the work the Contractor shall furnish the Consultant with written monthly reports setting forth the condition and progress of the work, the percentage of each part of the work that has been finished, those parts of



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the work which have been completed within the scheduled time and those parts of the work which have not been finished within the scheduled time, and the general progress of the work that is being performed away from the site and the approximate date when such work will be finished and delivered to the site. Contractor agrees that compliance with this Section 3.06 is an express condition precedent to the Contractor's right, claim or entitlement to obtain an extension of time for the performance of the Contractor's work. Failure to comply with this Section 3.06 shall be a waiver and relinquishment of all such rights, claims and privileges to request or obtain an extension of time for the performance of Contractor's work.

**Article IV**  
**Payment**

**Section 4.01 Compensation to Be Paid Contractor**

The University shall pay to the Contractor and the latter shall accept as full and complete payment for the performance of this Agreement, subject to additions or deductions as provided herein, the sum of identified on page one of this agreement which sum is the amount of the Contract consideration.

**Section 4.02 Value of Omitted and Extra Work**

(1) The amount by which the Contract consideration is to be increased or decreased by any Change Order or Field Order shall be determined by the University by one or more of the following methods:

- a. By applying the applicable price or prices set forth on the attached Schedule "I" of this Agreement or by applying a unit price agreed to by both parties. Subject to the provisions of Section 4.04, this method must be used if the Contract Documents contain applicable unit prices.
- b. By estimating the fair and reasonable cost of: (i) labor, including all wages, required wage supplements and insurance required by law (workers' compensation, social security, disability, unemployment, etc.) paid to or on behalf of foremen, workers and other employees below the rank of superintendent directly employed at the site of the Project; (ii) materials; and (iii) equipment, excluding hand tools, which, in the judgment of the University, would have been or will be employed exclusively and directly on the omitted work or extra work, as the case may be; and, in the case of extra work, where the same is performed directly by the Contractor, by adding to the total of such estimated costs a sum equal to 15 percent thereof, but, where the extra work is performed by a subcontractor, by adding a sum equal to 15 percent of said costs for the benefit of such subcontractor, and by adding, for the benefit of the Contractor (no further allowance will be made where extra work is performed by the sub-subcontractor), an additional sum equal to 10 percent of the first \$10,000 of the above-estimated costs, including the subcontractor's percentage override, plus 5 percent of the next \$90,000 of the total of said items, plus 3 percent of any sum in excess of \$100,000 of the total of said items. There is no markup on the premium portion of overtime labor. For the purposes of the aforesaid percentage overrides, the words "extra work" shall be defined as a complete item of added, modified or changed work as described in the Consultant's written instructions to the Contractor. Such "extra work" may include the work of one or more trades and/or subcontractors or sub-subcontractors and shall include all labor, materials, plant, equipment, tools and all incidentals directly and/or indirectly necessary, related, involved in or convenient to the successful completion of the extra work item. Where the Consultant's aforesaid written instructions to the Contractor involve both an increase and a reduction in similar or related work, the above percentage overrides will be applied only on the amount, if any, the cost of the increased work exceeds the cost of the reduced work.

No overhead and profit shall be retained by the Contractor on the cost of work determined by the method provided in Subparagraph (1)a.

All profit, overhead and expense of whatsoever kind and nature, other than those set forth above in items (i) through (iii), of the Contractor, its subcontractors and sub-subcontractors, are covered by the aforesaid percentage overrides and no additional payment therefor will be made by the University.

The University may make such cost estimate either before or after the extra work is completed by the Contractor.

- c. By determining the actual cost of the extra work in the same manner as in the above subdivision b except that actual costs of the Contractor shall be utilized in lieu of estimated costs. The University shall have the option to utilize this method provided it notifies the Contractor of its intent to do so prior to the time the Contractor commences performance of such extra work.

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- (2) Irrespective of the method used or to be used by the University in determining the value of a Change Order or Field Order, the Contractor, within fifteen (15) working days after a request for the same, must submit to the University and the Consultant a detailed breakdown of the Contractor's estimate of the value of the omitted and/or extra work in a format approved by the University.
- (3) Equipment Watch Rental Rate Blue Book (published online by Intertec Penton Media, Inc.) or other published rates as approved by the University in writing, will be utilized for the equipment rental pricing. For the purposes of paragraph (1) hereof, the cost of equipment shall be determined, irrespective of the actual price for any rental or actual cost associated with such equipment as follows: take the monthly rate listed in Equipment Watch and dividing the same by 176 hours to establish an hourly rate and then multiplying such hourly rate by the actual number of hours that the equipment was used. The Contractor will submit an actual rental invoice, or acceptable quotation from a bonafide equipment rental supplier for rented equipment when equipment is not owned by the Contractor. The equipment rental supplier cannot be an "affiliate" of the Contractor, nor in any way be related to the Contractor. If submitted invoices/quotations are acceptable to the University, the Contractor will be reimbursed the actual rental cost including sales tax and appropriate mark-up. If no listing of rates for an item of equipment is contained in Equipment Watch, the University shall determine the reasonable rate of rental of the particular item of equipment by such other means as it finds appropriate. The edition Equipment Watch to be used shall be that in effect on the date of the receipt of bids for this Agreement. None of the provisions of Equipment Watch shall be deemed referred to or included in this Agreement excepting only the aforesaid monthly rates. To the cost of equipment as determined above, there is to be added the actual cost of gasoline, oil, grease and maintenance required for operation of such equipment and, in the case of equipment utilized only for extra work when, in the opinion of the Consultant, suitable equipment therefor was not available on the site, the reasonable cost of transporting said equipment to and from the site. Notwithstanding the foregoing, if the Consultant should determine that the nature or size of the equipment used by the Contractor in connection with the extra work is larger or more elaborate, as the case may be, than the size or nature of the minimum equipment determined by the Consultant to be suitable for the extra work, the cost of equipment will not be based upon the equipment used by the Contractor but instead will be based on the smallest or least elaborate equipment determined by the Consultant to have been suitable for the performance of the extra work.
- (4) Unless otherwise specifically provided for in a Change Order or Field Order, the compensation specified therein for extra work includes full payment for both the extra work covered thereby and for any damage or expense caused the Contractor by any delays to other work to be done under the Contract resulting from or on account of said extra work, and the Contractor waives all rights to any other compensation for said extra work, damage or expense.

**Section 4.03 Adjustment for Bond and Insurance Premiums**

Upon final acceptance of the work to be performed under this Agreement, the University may adjust the Contract consideration to reflect any changes in the cost of all required Bonds and liability and builder's risk insurance premiums which the Contractor had to pay for on all extra work and would have had to furnish and pay for on all omitted work. Unless such cost is agreed upon by the University and the Contractor, the University may calculate and determine the amount of the adjustment in the Contract consideration by estimating such costs. There is no markup on bond or insurance premium adjustment.

**Section 4.04 Unit Prices**

- (1) Except as otherwise provided in the second paragraph of this Section, the unit prices, set forth on the attached Schedule "I" of this Agreement, will be binding upon both the University and the Contractor in determining the value of omitted and/or extra work, and, in the case of extra work, such unit prices shall be deemed to include all profit, overhead and expenses of whatsoever kind and nature of the Contractor, its subcontractors and sub-subcontractors, and the Contractor agrees that it shall make no claim for any profit, overhead, expense or percentage override in connection therewith.
- (2) Where said Schedule "I" sets forth a unit price for added and/or deducted work, the University shall have the option, whenever it is found that the quantity of changed work varies by more than 15 percent from the quantity that is stated or that can be determined by the Contract Documents at the time of execution thereof, to accept or reject such unit price for the quantity that the changed work varies by more than 15 percent from the stated or determinable quantity. Where a quantity is not specifically stated in the Contract Documents, the University's determination of the amount of said quantity included in the Contract Documents shall determine the applicability

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of this paragraph. Where the University, pursuant to the foregoing provisions, exercises its aforesaid option, the amount of the increase or decrease in the Contract consideration for the quantity of work which varies by more than 15 percent from the stated or determinable quantity shall be determined in accordance with the provisions of Section 4.02 of the Agreement as if there was no unit price therefor set forth in said Schedule "I".

**Section 4.05 Allowances**

- (1) The Contractor acknowledges that the Contract consideration includes the allowances set forth on the attached Schedule "II" and "III" of this Agreement and, except for quantitative and field order allowances, it agrees to cause the work covered thereby to be done by such contractors for such sums as the University may direct. Where cash allowances are provided, the allowances shall be deemed to include the purchase of the materials and/or equipment and the delivery of same to the job site. Unless otherwise specified in the Contract Documents, cash allowances do not include the proper installation of the materials and/or equipment or the connection for final utilities thereto; the cost of said installation and/or connection having been included in the amount of the Contract consideration.
- (2) The Contractor acknowledges that the Contract consideration includes such sums for expenses and profit on account of cash allowances as it deems proper and that it shall make no claim for expenses or profit or any percentage override in addition thereto; said items having been included in the amount of the Contract consideration.
- (3) In the event any of the cash allowances listed below are either higher or lower than the cost of having the work done in accordance herewith, the Contract consideration shall be adjusted to reflect such variance, the amount of said adjustment to be the difference between the amount of the allowance and the actual cost of performing the work covered thereby.
- (4) When quantitative allowances are provided, progress payments thereof to the Contractor will be based upon the applicable unit prices set forth on the attached Schedule "I" of the Agreement, subject, however, to the provisions of paragraph (2) of Section 4.04. In the event any of said quantitative allowances are more than or less than the actual quantity of work performed, the Contract consideration shall be adjusted to reflect such variance, the amount of said adjustment to be determined in accordance with the provisions of Sections 4.02, 4.04 and 4.05A of the Agreement.

**Section 4.05A Field Orders**

When the Agreement contains a Field Order Allowance, the bid shall include the amount of such allowance. Said amount shall cover the cost of additional labor, materials and time for contingent activities within the scope of the Agreement as directed and described by the University in writing in a Field Order. The Field Order will include a description of the work and the method for determining the value of such work. The value of the work directed under this allowance will be determined by one or more of the provisions of Section 4.02. If the net cost(s) of all Field Orders issued are more or less than the specified amount of the allowance, the Contract sum will be adjusted by Change Order.

**Section 4.06 Deductions for Unperformed and/or Uncorrected Work**

- (1) Without prejudice to any other rights, remedies or claims of the University, in the event that the Contractor at any time fails or neglects to supply working forces and materials of the proper quantity and quality necessary, in the opinion of the Consultant or the University, to comply with the approved time progress schedule, or fails in any respect to prosecute the work with promptness and diligence or causes by any action or omission the stoppage or delay of or interference with the work of any other contractor having a contract with the University, or fails in the performance of any obligations and responsibilities under this Agreement, then, and in that event, the University, acting itself or through the Consultant, may, upon three (3) working days' notice to the Contractor, either itself provide or have any other contractor, including but limited to the University's Job Order Contracting Program, provide any and all labor or materials or both necessary, in its opinion, to correct any aforesaid deficiency of the Contractor, and the University will thereafter backcharge the Contractor by issuing a Change Order reducing the amount of the Contract consideration for all costs and expenses it incurs in connection with the correction of such deficiency. The Contractor agrees that the University may deduct from any application for payment made by the Contractor, any and all Design Professional, Consultant and/or Construction Management fees and costs incurred by the University together with a markup upon such hard costs in the amount of 15% for services required in connection with the correction of such deficiency(ies).



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- (2) Notwithstanding any provisions in the Contract Documents to the contrary, if the University deems it inexpedient to correct work not done in accordance with the Contract or any work damaged as a result thereof, it shall notify the Contractor of such fact and the latter shall not remedy or correct the same. In such event, however, the amount of the Contract consideration shall be decreased by an amount, determined by the University, which is equal to the difference in value of the work as performed by the Contractor and the value of the work had it been satisfactorily performed in accordance with the Contract or which is equal to the cost of performing the corrective work, whichever shall be the higher amount.

**Section 4.07 Liquidated Damages**

In the event that the Contractor shall fail to substantially complete all the work within the time fixed for such completion on page one of this agreement, or within the time to which such completion may have been extended or in the event that the Contractor abandons the work and the same is not substantially completed within the aforesaid time for such completion, the Contractor must pay to the University as damages for each calendar day of delay in completing the work the amount set forth on page one of the Contractor's proposal, as stated on page one of this agreement. . In view of the difficulty of accurately ascertaining the loss which the University will suffer by reason of delay in completion of the work hereunder, said sum is hereby fixed and agreed as liquidated damages which the University will suffer by reason of such delay and not as a penalty. The University may deduct and retain out of the monies which may become due hereunder to the Contractor the amount of any such liquidated damages and, in case the amount which may become due to the Contractor under the provisions of the Contract may be less than the liquidated damages suffered by the University, the Contractor shall pay the difference, upon demand, to the University.

**Section 4.08 Contract Breakdown**

Prior to the submission of its first application for a progress payment, the Contractor shall present to the University and the Consultant for their approval a detailed schedule showing the breakdown of the Contract consideration. The Contract Breakdown Summary shall be further broken down as required by the Consultant and the University. Such schedule must contain the amount estimated for each part of the work and quantity survey for each part of the work. It shall also list the estimated value of the Contractor's guarantee obligations under the provisions of the Contract Documents, which is hereby fixed at \$5,000 or one-half of one percent (1/2%) of the Contract award amount, whichever is the lesser sum. Such schedule shall be revised by the Contractor until the same shall be satisfactory to the University and the Consultant and shall not be changed after the University and the Consultant have approved the same. The amounts set forth in the schedule will not be considered as fixing the basis for additions to or deductions from the Contract consideration.

**Section 4.09 Prompt Payment Requirements**

- (1) For the purposes of Article XI-A of the State Finance Law, the campus for which the work is being performed is the University's designated payment office. Applications for payment must contain the approval of the Consultant before being submitted to the University.
- (2) Whenever the Consultant's approval of an application for payment is required under the Contract, the Consultant shall have fifteen (15) calendar days, after receipt of such application, to inspect the work before acting on the application.
- (3) Until such time that the Contract is approved by the University, the thirty (30) day period, referred to in Article XI-A of the State Finance Law for the payment of invoices without interest, shall not begin.

**Section 4.10 Progress Payments**

- (1) Unless otherwise provided in the Contract, progress payments will be made as the work progresses upon applications submitted by the Contractor and approved by the Consultant and the University. Payment of such approved applications shall be made by the University within thirty (30) days after such approval has been given.
- (2) The University shall make progress payments to the Contractor on the basis of such approved applications, less a retained amount equal to 5 percent thereof (i.e. retainage) , plus an amount necessary, in the University's judgment, to satisfy any claims, liens or judgments against the Contractor which have not been suitably discharged, , together with any back charges and offsets which are deemed necessary or likely to be incurred by the University as a result of any failure by the Contractor to fully, completely, accurately and timely perform its work, which it shall reserve from each such payment until all of the work covered by the Contract has been completed.

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- (3) When the University and the Consultant have determined that all the work is substantially completed, or that a substantial portion of the permanent construction has been completed and accepted, the University shall make a progress payment to the Contractor, on the basis of an application submitted by the Contractor and approved by the Consultant and the University, which shall reduce the unpaid amount due to the Contractor under the terms of the Contract, including all monies retained by the University from previous progress payments to the Contractor, to an amount equal to two (2) times the cost, estimated by the Consultant, of performing, in accordance with the Contract, all uncompleted, unaccepted and corrective work, plus an amount necessary, in the University's judgment, to satisfy any claims, liens or judgments against the Contractor which have not been suitably discharged. As the remaining items of work are satisfactorily completed or corrected, the University shall make progress payments to the Contractor, on the basis of applications submitted by the Contractor and approved by the University and the Consultant, covering said items of work less an amount necessary, in the University's judgment, to satisfy any claims, liens or judgments against the Contractor which have not been suitably discharged.

**Section 4.11 Applications for Progress Payments**

The Contractor shall prepare all applications for progress payments for work performed, together with supporting data and computations as are deemed necessary by the Consultant to determine the accuracy of the application. The application for payment and all required supporting documentation shall be submitted using the University's prescribed forms. The Contractor shall include with such applications reports detailing actual payments to minority and women-owned businesses who participate on University projects. Failure of the Contractor to submit applications for progress payments, or lack of complete and accurate supporting data, shall be sufficient reason for withholding payment until such omissions or errors are rectified. Unless otherwise directed, such applications, signed and certified as correct by the Contractor, shall be delivered by the Contractor to the Consultant once each month showing the total value of work completed and in place on the last day of the payment period covered by the application.

**Section 4.12 Progress Payments for Materials Delivered to Site**

- (1) Progress payments made in accordance with Section 4.10 shall include a payment for materials and equipment to be furnished and installed under the Contract, after such materials and equipment have been delivered and accepted at the site of the work.
- (2) Materials and equipment for which such progress payment has been made shall not be removed from the site, shall be stored until incorporated into the work in a location approved by the Consultant and shall be adequately protected from fire, theft and vandalism, the effects of the elements and any other damage whatsoever, and shall at all times be available for inspection by the Consultant and the University.

**Section 4.13 Transfer of Title to Materials Delivered to Site**

Title to all supplies and materials to be furnished or provided by the Contractor to the University pursuant to the provisions of the Contract Documents shall immediately vest in and become the sole property of the University upon delivery of such supplies and materials to the site. Notwithstanding such transfer of title, the Contractor shall have the full continuing responsibility to install such materials and supplies, protect them, maintain them in proper condition and forthwith repair, replace and make good any damage thereto without cost to the University until such time as the work covered by the Contract is fully accepted by the University. Such transfer of title shall in no way affect any of the Contractor's obligations under the Contract. In the event that, after title has passed to the University, any of such supplies and materials are rejected as being defective or otherwise unsatisfactory, title to all such supplies and materials shall be deemed to have been transferred back to the Contractor.

**Section 4.14 Progress Payments for Materials Stored Off Site**

- (1) Progress payments made in accordance with Section 4.10 shall include a payment for materials and equipment which are in short and/or critical supply or have been specially fabricated for the Project. Materials and equipment, for which a progress payment is made pursuant to the preceding sentence, shall be stored by the Contractor, after fabrication, until such time as their delivery to the site is required, at a facility and location approved by the Consultant; shall be adequately protected from fire, theft and vandalism, the effects of the elements and any other damage whatsoever; and shall at all times be available for inspection by the Consultant and the University. No progress payment shall, however, be made for said materials and equipment until:
- a. The Contractor furnishes to the University a bill of sale listing quantity and costs of said materials and equipment f.o.b. point of origin;

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- b. The Consultant shall have inspected said materials and equipment and recommended payment therefor; and
  - c. The Contractor furnishes to the University a builder's risk insurance policy, with the broad form extended coverage endorsement, for said materials and equipment, in an amount equal to 100 percent of the value thereof, which policy shall be maintained, at the sole cost and expense of the Contractor, until said materials and equipment have been incorporated into the Project. The said insurance policy shall contain a provision that the loss, if any, is to be made adjustable with and payable to the University as trustee for the insured, i.e., the University and the Contractor, and a provision that it shall not be changed or cancelled and that it will be automatically renewed upon expiration and continued in force unless the University is given thirty (30) days written notice to the contrary.
  - d. The Contractor shall develop and provide a preventive maintenance log for stored equipment when determined appropriate by the Consultant. The Contractor shall provide timely notification and opportunity for the Consultant and the University to view the Contractor's preventative maintenance efforts.
- (2) Materials and equipment for which a progress payment has been made by the University pursuant to this Section shall be, become and remain the sole property of the University; provided, however, that the Contractor shall have the full continuing responsibility to install such materials and equipment, to deliver it to the site, to protect it, to maintain it in proper condition and to forthwith repair, replace and make good any damage thereto without cost and/or additional time to the University until such time as the work covered by the Contract is fully accepted by the University. Such transfer of title shall in no way affect any of the Contractor's obligations under the Contract.

**Section 4.15 Withholding of Progress Payments**

Notwithstanding anything contained in the Contract to the contrary, the University may withhold payment of all or any part of a progress, final or guarantee payment, in such an amount as it may deem proper to enforce the provisions of the Contract and to satisfy the claims of third parties, when:

- a. The University shall learn of any claim, of whatsoever nature or kind, against the University or the Contractor, which in any way arises or is alleged to arise out of or as a result of or in connection with the performance by the Contractor of the work covered by the Contract or out of or in connection with the Contractor's operations or performance at or in the vicinity of the construction site, that, in the opinion of the University, may not be adequately covered by insurance.

If an action on such claim is timely commenced and the liability of the University and/or the Contractor shall have been established therein by a final judgment of a court of competent jurisdiction, or if such claim shall have been admitted by the Contractor to be valid, the University shall pay such judgment or admitted claim out of the monies retained by it under the provisions of the Contract and return the balance, if any, without interest, to the Contractor.

The University may withhold from the Contractor any payments retained by it until such time as all such claims are either satisfied or barred by law from being presented. At such time the University, upon written demand by the Contractor, shall return to the Contractor the amount so withheld, without interest.

- b. The Contractor has not complied with any lawful or proper direction of the Consultant or the University or their representatives concerning the work covered by the Contract or the performance of the Contract or the production of records as required under the provisions of the Contract.
- c. There exists any of the conditions, listed in Section 2.26, which would allow the University to declare the Contractor in default of the whole or any part of the work.
- d. The Contractor is a foreign contractor and has not furnished satisfactory proof that all taxes due by such Contractor under the provisions of the Tax Law have been paid. The Certificate of the New York State Tax Commission to the effect that all such taxes have been paid shall be conclusive proof of the payment of such taxes. The term "foreign contractor" as used herein means, in the case of an individual, a person who is not a resident of the State of New York; in the case of a partnership, one having one or more partners not a resident of the State; and in the case of a corporation, one not organized under the laws of the State of New York.

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- e. The Contractor, upon request of the University at any time after the initial progress payment by the University to the Contractor, fails to furnish the University with such documentary evidence that the University may deem necessary to prove to it that material and labor paid for by the University under previous applications for payment submitted have been paid for by the Contractor and that there are no outstanding claims or liens in connection therewith or fails to satisfy the University that the Contractor, with good cause, has sufficiently provided for the payment and/or satisfaction of claims for said material and labor.

**Section 4.16 Lien Law**

The attention of the Contractor is specifically called to the provisions of the Lien Law of the State of New York, wherein funds received by a Contractor for a public improvement are declared to constitute trust funds in the hands of such Contractor to be applied first to the payment of certain claims.

**Section 4.17 Substitution of Securities for Retainage**

Any time after 50 percent of all the work has been completed, the University, if the progress and performance of the work is satisfactory to it, on request of the Contractor, will allow the Contractor to withdraw up to 50 percent of the aforesaid amount retained by the University by depositing with the Comptroller of the State of New York government securities, of the type and kind specified in Section 139 of the State Finance Law, having a market value not exceeding par, at the time of deposit, equal to the amount so withdrawn. The Comptroller of the State of New York shall, from time to time, collect all interest or income on the obligations so deposited, and shall pay the same, when and as collected, to the Contractor. If the deposit be in the form of coupon bonds, the coupons as they respectively become due shall be delivered to the Contractor; provided, however, that the Contractor shall not be entitled to interest or coupons or income on any of the deposited securities, the proceeds of which have or will be used or applied by the University. In the event that the Contractor does not, in accordance with the terms and provisions of the Contract, comply with and fulfill all of its obligations and responsibilities thereunder, the Comptroller of the State of New York shall have the right to sell, assign, transfer or otherwise dispose of the aforesaid securities and the University shall have the right to use and apply all or any part of the monies obtained by the Comptroller of the State of New York from such a sale, assignment, transfer or disposition or from the collection of interest or income from said securities to the performance and fulfillment of said obligations and responsibilities. Notwithstanding the foregoing, when the University makes a payment under Section 4.10 (3) of the Agreement, it will return to the Contractor, as part of such payment, its substituted securities, and thereafter all retention of the University shall be in funds and not in substituted securities.

**Section 4.18 Final Payment**

Upon acceptance of all the work, except for the Contractor's guarantee obligations under Section 2.25 of the agreement and the Contractor's guarantee obligations under any provision of the Specifications, the Contractor shall prepare and submit to the University and the Consultant, for their approval, a final application for payment, which the University, within thirty (30) days after its approval of same, shall pay. Such application and payment shall be in an amount equal to 100 percent of the Contract consideration excluding the Contractor's guarantee obligations, less:

- a. All previous payments by the University to the Contractor;
- b. All deductions authorized to be made by the University under the Contract; and
- c. An amount necessary, in the University's judgment, to satisfy any claims, liens or judgments against the Contractor which have not been suitably discharged.
- d. The Contractor shall not be entitled to any interest on the monies retained by the University pursuant to Subdivision c of Section 4.18 of the Agreement.

**Section 4.19 Acceptance of Final Payment**

- (1) The acceptance by the Contractor, or by any one claiming by or through it, of the final payment shall, except with respect to the amount retained by the University pursuant to the provisions of subdivisions b and c of Section 4.18 of the Agreement, constitute and operate as a release to the University from any and all claims of any liability for anything theretofore done or furnished for or relating to or arising out of the work covered by the Contract and for any prior act, neglect or default on the part of the University or any of its trustees, officers, agents or employees in connection therewith.



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- (2) Should the Contractor refuse to accept the final payment as tendered by the University or should the Contractor refuse to execute the final application for payment without protest and without reserving any rights or claims against the University, it shall constitute a waiver of any right to interest on the amount of the payment so tendered and/or on the amount set forth in said final application for payment.

**Section 4.20 Guarantee Payment**

- (1) Subject to the provisions of the second paragraph of this Section, at the expiration of one (1) year after the University has accepted all the work covered by the Contract, the Contractor shall prepare and submit to the University and the Consultant, for their approval, a guarantee application for payment, which the University, within thirty (30) days after its approval of same, shall pay. Such application and payment shall be in an amount equal to the monies retained by the University for the Contractor's guarantee obligations under the Agreement, less any monies deducted by the University under this Section. The Contractor shall not be entitled to any interest on the monies retained by the University pursuant to subdivision c of Section 4.18 of the Agreement.
- (2) In the event the Contractor does not, in accordance with the terms and provisions of the Contract, complete all corrective work or comply with and fulfill its contractual obligations, the University may use and apply all or any part of the monies retained by it to have such work or obligations performed or fulfilled by a person, firm or corporation other than the Contractor. The obligations of the Contractor, under the terms and provisions of the Contract, shall not, however, be limited to the monies retained by the University pursuant to the provisions of the Contract.
- (3) No payments may be made under this agreement for work completed more than 365 days after the completion date listed on page one of this agreement unless the date/duration listed on page one of this agreement, is extended in writing by the University.

**Section 4.21 Acceptance of Guarantee Payment**

The acceptance by the Contractor or by anyone claiming by or through it, of the guarantee payment shall constitute and operate as a release to the University from any and all claims in connection with monies retained by the University. Should the Contractor refuse to accept the guarantee payment as tendered by the University or should the Contractor refuse to execute the guarantee application for payment without protest and without reserving any rights or claims against the University, it shall constitute a waiver of any right to interest on the amount of the payment so tendered and/or on the amount set forth in said guarantee application for payment.

**Section 4.22 Contractor Limited to Money Damages**

Inasmuch as the Contractor can be compensated adequately by money damages for any breach of the Contract which may be committed by the University, the Contractor agrees that no default, act or omission of the University shall constitute a material breach of the Contract entitling it to cancel or rescind the same or to suspend or abandon performance thereof; and it hereby waives any and all rights and remedies to which it might otherwise be or become entitled to because of any wrongful act or omission of the University or its representatives, saving only its right to money damages.

**Section 4.23 No Estoppel or Waiver**

- (1) The University shall not be precluded or estopped by any inspection, acceptance, application for payment or payment, final or otherwise, issued or made under the Contract or otherwise issued or made by it, the Consultant, or any trustee, officer, agent or employee of the University, from showing at any time the true amount and character of the work performed, or from showing that any such inspection, acceptance, application for payment or payment is incorrect or was improperly issued or made; and the University shall not be precluded or estopped, notwithstanding any such inspection, acceptance, application for payment or payment, from recovering from the Contractor any damages which it may sustain by reason of any failure on its part to comply strictly with the Contract and any monies which may be paid to it or for its account in excess of those to which it is lawfully entitled.
- (2) Neither the acceptance of all or any part of the work covered by the Contract; nor any payment therefor; nor any order or application for payment issued under the Contract or otherwise issued by the University, the Consultant, or any trustee, officer, agent or employee of the University; nor any permission or direction to continue with the performance of the Contract before or after its specified completion date; nor any performance by the University of any of the Contractor's duties or obligations; nor any aid lent to the Contractor by the University in its

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performance of such duties or obligations; nor any delay or omission by the University to exercise any right or remedy accruing to it under the terms of the Contract or existing at law or in equity or by statute or otherwise; nor any other thing done or omitted to be done by the University, its trustees, officers, agents or employees; shall be deemed to be a release to the Contractor or its sureties from any obligations, liabilities or undertakings in connection with the Contract or the Performance Bond or a waiver of any provision of the Contract or of any rights or remedies to which the University may be entitled because of any breach thereof, excepting only a written instrument expressly providing for such release or waiver. No cancellation, rescission or annulment hereof, in whole or as to any part of the Contract, because of any breach hereof, shall be deemed a waiver of any money damages to which the University may be entitled because of such breach. No waiver by the University of any breach of the Contract shall be deemed to be a waiver of any other or any subsequent breach.

**Section 4.24 Limitation of Actions**

- (1) No action or proceeding shall be maintained by the Contractor, or anyone claiming under or through the Contractor, against the University, or its trustees, officers, agents or employees, upon any claim arising out of or based upon the Contract or any breach thereof or by reason of any act or omission or requirement of the University, or its trustees, officers, agents or employees, unless:
  - a. Such action or proceeding shall be instituted in the Court of Claims in the State of New York.
  - b. The Contractor or the person claiming under or through it shall have strictly complied with all requirements relating to the giving of notices and information with respect to such claims; and shall have provided the University with an electronic version of any claims, including all required information and copies of all contractually required notices that the Contractor provided to the University and the Consultant throughout the duration of the Contract ;
  - c. Such action or proceeding by the Contractor shall be commenced within eighteen months after the date of substantial completion set by the University or its Consultant and issued in writing to the Contractor. Any action or proceeding not commenced within this time frame shall be dismissed with prejudice.
  - d. If the Contract is terminated or the Contractor declared in default by the University, such action is commenced within six (6) months after the date of such termination or declaration of default by the University.
  - e. The Parties shall use good faith efforts to amicably resolve any dispute arising under this Agreement. If the Parties are unable to amicably resolve the dispute within thirty (30) days, then either Party may seek legal or equitable redress.
- (2) Notwithstanding anything in the laws of the State of New York to the contrary, the Contractor, or anyone claiming under or through the Contractor, shall not be entitled to any additional time to begin anew any other action if an action commenced within the times herein specified is dismissed or discontinued for any reason whatsoever.

**Section 4.25 Electronic Payments**

The Contractor shall provide complete and accurate payment applications in order to receive payment. Payment applications submitted must contain all information and supporting documentation required by the University. Payment for applications submitted by the Contractor shall only be rendered electronically unless payment by paper check is expressly authorized by the University's sole discretion, due to extenuating circumstances. Such electronic payment shall be made in accordance with ordinary State procedures and practices. The Contractor shall comply with the State Comptroller's procedures to authorize electronic payments. Authorization forms are available at the Office of the State Comptroller's website at [www.osc.state.ny.us/epay/index.htm](http://www.osc.state.ny.us/epay/index.htm); by email at [epunit@osc.state.ny.us](mailto:epunit@osc.state.ny.us); or by telephone at 518-474-4032. The Contractor acknowledges that it will not receive payment on any invoices submitted under this Agreement if it does not comply with the State Comptroller's electronic payment procedures, except where the University has expressly authorized payment by paper check as set forth above.

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**Article V**  
**Protection of Rights and Property**

**Section 5.01 Accidents and Accident Prevention**

The Contractor shall at all times take reasonable precautions for the safety of persons engaged in the performance of the work. The Contractor shall comply fully with all applicable provisions of the laws of the State of New York and OSHA and with all valid rules and regulations thereunder. The Contractor's attention is specifically called to the applicable rules and regulations, codes and bulletins of the New York State Department of Labor.

**Section 5.02 Adjoining Property**

The Contractor shall be required to protect all the adjoining property and to repair or replace any such properties damaged or destroyed by it, its employees or subcontractors through, by reason of or as a result of activities under, for or related to the Contract.

**Section 5.03 Emergencies**

- (1) In case of an emergency which threatens loss or injury to persons or property, the Contractor will be allowed to act, without previous instructions from the Consultant or the University, in a diligent manner, to the extent required to avoid or limit such loss or injury, and it shall notify the Consultant and the University immediately thereafter of the action taken by it and of such emergency. Where the Contractor has not taken action but has notified the Consultant or the University of an emergency which threatens loss or injury to persons or property, it shall act in accordance with the instructions and/or authorization by the Consultant or the University.
- (2) In the event that the Contractor performs extra work in accordance with the preceding paragraph, it will be compensated therefor in accordance with the provisions of Section 4.02.

**Section 5.04 Fire Safety**

- (1) If the existing building is to be partially occupied during the course of the project, all existing exits except those shown for closure, fire walls, fire barriers and fire protection systems shall be continuously maintained in the occupied phases in compliance with the Fire Code of New York State and as required by NFPA 241 and as recommended in its Annex A, Explanatory Material, or other measures must be taken which in the opinion of the Consultant will provide equal safety. Those portions occupied by the campus must be available for their use 24 hours a day, seven days a week during the contract period unless otherwise scheduled in these documents. Comply with all applicable State and Federal codes and regulations. Prior to removal of existing fire walls, fire barriers and fire protection systems, if such removal is part of the work, install equivalent temporary fire walls, fire barriers and fire protection systems. The cost of all labor, fire watches, variances, materials, installations, maintenance and removal of such temporary fire protection systems or modifications to the existing systems are the responsibility of the Contractor. Install permanent fire walls, fire barriers and fire protection systems, if provided as part of the work, as soon as practical and as required by NFPA 241 and as recommended in its Annex A, Explanatory Material.
- (2) Solid fuel salamanders and heaters shall not be used by the Contractor or any of its subcontractors. All other salamanders used by the Contractor or any of its subcontractors shall require constant attendance of competent persons on each floor where in use.
- (3) All temporary fabric used by the Contractor or any of its subcontractors for curtains or awnings shall be either non-combustible or flame retarded so that it will not burn or propagate flame.

**Section 5.05 Risks Assumed by Contractor**

- (1) To the fullest extent permitted by law, the Contractor solely assumes the following distinct several risks whether they arise from acts or omissions (whether negligent or not and whether supervisory or otherwise) of the Contractor, of the University, of third persons or from any other cause, including unforeseen obstacles and difficulties which may be encountered in the prosecution of the work covered by the Contract, whether such risks are within or beyond the control of the Contractor and whether such risks involve a legal duty, primary or otherwise, imposed upon the State University Construction Fund, the Dormitory Authority of the State of New York, the State of New York or the State University of New York, excepting only risks which arise from defects in maps, plans, designs or Specifications prepared, acquired or used by the Consultant or the University, from the negligence of the University, its agents or employees or from affirmative acts of the, State University Construction Fund, the Dormitory Authority of the State

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of New York, the State of New York or the State University of New York or their trustees, officers, agents or employees committed with intent to cause the loss, damage and injuries herein below set forth:

- a. The risk of loss or damage, direct or indirect, to the work covered by the Contract or to any plant, equipment, tools, materials or property furnished, used, installed or received by the University or by the Contractor or any subcontractor, material man or worker performing services or furnishing materials for the work covered hereunder. The Contractor shall bear such risk of loss or damage until the work covered by the Contract has been finally accepted by the University or until completion of removal of such plant, equipment, tools, materials or property from the construction site and the vicinity thereof, whichever event occurs last. In the event of such loss or damage, the Contractor shall forthwith repair, replace and/or make good any such loss or damage without cost to the University.
  - b. The risk of claims, just or unjust, by third persons against the Contractor, the State University Construction Fund, the Dormitory Authority of the State of New York, the State of New York, or the State University of New York on account of wrongful death, bodily injuries and property damage, direct or consequential, loss or damage of any kind whatsoever arising or alleged to arise out of or as a result of or in connection with the performance by the Contractor of the work covered by the Contract (whether actually caused by or resulting from the performance of the Contract) or out of or in connection with the Contractor's operations or presence at or in the vicinity of the construction site.
- (2) To the fullest extent permitted by law, the Contractor shall indemnify and save harmless the State University Construction Fund the Dormitory Authority of the State of New York, the State of New York and the State University of New York, their trustees, officers, agents or employees against all claims described above and for all costs and expenses incurred by them in the defense, settlement or satisfaction thereof, including attorneys' fees and court costs. If so directed, the Contractor shall at its own expense defend against such claims, in which event it shall not, without obtaining express advance permission from Counsel of the University, raise any defense involving in any way jurisdiction of the tribunal over the University, governmental nature of the University or the provisions of any statutes respecting suits against the University.
- (3) Neither the University's final acceptance of the work to be performed hereunder nor the making of any payment shall release the Contractor from its obligations under this Section. The enumeration elsewhere in the Contract of particular risks assumed by the Contractor or of particular claims for which it is responsible shall not be deemed to limit the effect of the provision of this Section or to imply that it assumes or is responsible for only risks or claims of the type enumerated.

**Section 5.06 Insurance Requirements**

(1) General Provisions

- a. Prior to the execution of the Agreement, the Contractor shall at its sole cost and expense, procure and furnish to the University a Certificate of Insurance and required endorsements in a form satisfactory to the University demonstrating that the Contractor has complied with the specific provisions of this Article and the Agreement, The Contractor shall maintain in force and effect at all times during the Agreement from Notice to Proceed until Final Acceptance, or as may otherwise be required by this Article and the Agreement, policies of insurance covering all operations under the Agreement whether performed by the Contractor or its subcontractors as herein set forth.
- b. All insurance required by the Agreement shall be written by companies that have an A.M. Best Company rating of "A-," Class "VII" or better. In addition, companies writing insurance intended to comply with the requirements of the Agreement shall be an admitted carrier approved by the New York State Department of Financial Services to issue insurance in the State of New York or meet such other requirements as may be acceptable to the University in its sole and exclusive discretion. If during the duration of coverage on the Agreement, the carrier's A.M. Best rating falls below "A-," Class "VII," the insurance must be replaced, on or before the renewal date of the policy with insurance that meets the requirements set forth herein.



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(2) Submission of Insurance

- a. **Coverage Types.** The types of insurance coverage and policy limits required from the Contractor pursuant to the Agreement are specified in Paragraph (3) Specific Coverage below and limits outlined in Schedule A attached hereto ("Schedule A").
- b. **Policy.** Except as may be otherwise specifically provided herein or agreed to in writing by the University, policies of insurance must be maintained on an occurrence basis at all times during the Agreement from Notice to Proceed until Final Acceptance, or as may be otherwise required by this Article and the Agreement, with limits not less than those set forth in Schedule A and as required by the terms of the Agreement, or as required by law, whichever is greater. If such insurance contains an aggregate limit, it shall apply separately on a per project basis.
- c. **Certificates of Insurance.** The Contractor shall provide the University a Certificate or Certificates of Insurance, on the appropriate Certificate of Liability Insurance ACORD form, as well as the ACORD 855 NY form for liability insurance including required policy endorsements, in accordance with New York Insurance Law and submitted directly by the insurance broker or agent to the University, before commencing any work under the Agreement. The certificate C105.2 or the U26.3 (State Insurance Fund) are the only acceptable proof of coverage for Worker's Compensation. The DB120.1 is the only acceptable proof of coverage for Disability Benefits. Certificates must reference the NAIC number of the issuing company, policy number, effective dates of coverage, policy limits consistent with Schedule A and the Agreement requirements, name the Additional Insureds, and shall name the University as the Certificate Holder.
- d. **Primary Coverage.** The liability and protective policies of insurance shall provide primary and non-contributory coverage to the Additional Insureds required in Section 5.06(2)(h) below for any claim arising from the Contractor's work under the Agreement, or because of the Contractor's activities. Any other insurance maintained by the University or Additional Insureds shall be in excess of and shall not contribute to the Contractor's insurance or subcontractor's insurance, regardless of the "other insurance" clause contained in the University's or Additional Insured's policy of insurance, if any. A copy of the endorsement reflecting this requirement may be requested by the University.
- e. **Policy Renewal/Expiration.** Unless otherwise agreed to in writing by the University, all insurance policies must have a policy period of at least one year. Not less than five (5) days prior to the expiration date or renewal date of the policy for insurance, the Contractor shall supply the University with updated replacement certificates of insurance and required endorsements. The Contractor shall give written notice to the University of any letter or notification that cancels, materially changes, or non- renews the policy and the Contractor shall require the insurance carrier(s) to copy the University on any letter or notification that cancels, materially changes, or non-renews the policy.

Unless otherwise agreed to in writing by the University, policies shall be written to include a provision that the policy will not be canceled, materially changed, or not renewed without at least thirty (30) days' prior, written notice except for non-payment, in which case notice shall be provided as required by law from the insurance carrier to the University. In addition, if required by the University, the Contractor shall deliver to the University within three (3) business days of such request a copy of any or all certificates of insurance and required endorsements not previously provided.

If, at any time during the Agreement, the University determines that the insurance as required is not in effect as per the terms of the Agreement, or proof thereof is not provided to the University, or the Contractor has otherwise failed to strictly adhere to the provisions of this Article, the University may withhold further Agreement payments and shall have the option to (i) direct the Contractor to stop work with no additional cost or extension of time due on account thereof; or (ii) treat such failure as an event of default under Section 2.26 of the Agreement..

With exception of the A.M. Best rating requirements, if at any time the coverage provisions and limits of the policies of insurance required herein do not meet the provisions and limits set forth in Schedule A and the Agreement, the Contractor shall immediately cease work on the project site. Further, the Contractor will not be allowed access to the project site without providing proof of proper insurance. The Contractor shall not resume work on the project until permitted to do so by the University. Any delay or time lost as a result of the Contractor

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not having insurance or providing proof thereof as required by this Article and the Agreement shall not give rise to a delay claim or any other claim by the Contractor against the University. If required by the University, the Contractor shall deliver to the University within fifteen (15) business days of such request, full and complete copies of any or all policies of insurance and endorsements relating to the project that were not previously provided, certified by the insurance carrier as true and complete.

- f. **Self-Insured Retention / Deductibles.** Certificates must disclose any Deductible, Self-Insured Retention, Aggregate Limit or any exclusion to the policy that materially changes the coverage required by the Agreement, and Deductibles or Self-Insured Retentions above \$25,000 shall be subject to approval from the University. The Contractor shall be solely responsible for all claim expenses and loss payments within the Deductible or Self-Insured Retention.
- g. **Subcontractors.** Should the Contractor engage subcontractors, the Contractor shall impose on those entities the general insurance requirements of this Article and the Agreement. Required insurance limits shall be determined commensurate with the work of the subcontractor. The Contractor shall maintain the subcontractor certificates of insurance and required endorsements on file which shall be delivered to the University within three (3) business days of such request. If required by the University, the Contractor shall deliver to the University within fifteen (15) business days of such request, full and complete copies of any or all subcontractor policies of insurance and endorsements relating to the project that were not previously provided, certified by the insurance carrier as true and complete.
- h. **Additional Insureds.** The Contractor shall cause to be included in each of the liability insurance policies coverage for on-going and completed operations naming as Additional Insureds, The People of the State of New York, the State University of New York, the Dormitory Authority of the State of New York, the Fund, other such entities as named in Schedule A, and their officers, agents, and employees ("Additional Insureds"). An Additional Insured Endorsement evidencing such coverage shall be provided to the University prior to the commencement of the Agreement. Additional Insured protection afforded must contemplate on-going and completed operations, and the additional insured protection for products/completed operations must remain in place for three years after Final Acceptance. For Contractors who have Self-Insured Retention, the Contractor shall be obligated to defend and indemnify the above-named Additional Insureds with respect to Commercial General Liability insurance and Business Automobile Liability insurance, in the same manner that the Contractor would have been required to pursuant to this Article had the Contractor obtained such insurance policies.
- i. **Waiver of Subrogation.** Unless otherwise agreed to in writing by the University, with the exception of Disability policies, all policies of insurance must be endorsed to provide that there shall be no right of subrogation against the State of New York, the State University of New York, the Dormitory Authority of the State of New York, the Fund, the Additional Insureds, and their officers, agents and employees. To the extent that any of the policies of insurance prohibit such a waiver of subrogation, the Contractor shall secure the necessary permission to make this waiver.

(3) Specific Coverage

The Contractor shall obtain and maintain in full force and effect, the following insurance with limits not less than those described in Schedule A and as required by the terms of the Agreement, or as required by law, whichever is greater:

- a. **Commercial General Liability Insurance.** A Commercial General Liability ("CGL") insurance policy with coverage that shall include, but not be limited to, coverage for bodily injury, property damage, personal/advertising injury, premises liability, independent contractors/ subcontractors, blanket contractual liability including tort liability of another assumed in contract, liability arising from all work and operations under the Agreement, defense and indemnification obligations, including those assumed under the Agreement, cross liability coverage for Additional Insureds, products/completed operations for a term no less than three years commencing upon Final Acceptance, explosion, collapse, and underground hazards, contractor means and methods, and liability resulting from Section 240 or Section 241 of the NYS Labor Law. Such policy shall be written on ISO Occurrence form CG 00 01 or a substitute form that is acceptable to the University, providing equivalent coverage.

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The General Aggregate limit included in the CGL insurance shall apply separately on a per project basis at the limits set forth herein in Schedule A.

Insurance policies that remove or restrict blanket contractual liability located in the "insured contract" definition (as stated in Section V, Number 9, Item f in the ISO CGL policy) so as to limit coverage against claims that arise out of the work under the Agreement, or that remove or modify the "insured contract" exception to the employers liability exclusion, or that do not cover the Additional Insureds for claims involving injury to employees of the Named Insured or subcontractors, are not acceptable.

In the event any work under the Agreement involves activity on or within 50 ft. of railroad property or a railroad right-of-way or requires entrance upon a railroad property or railroad right-of-way, or requires an assignment of a Railroad employee, any exclusion for such work must be deleted. In addition, the Contractor shall otherwise fully comply with Section 5.06 (3)h below. For purposes of this paragraph, a subway is also a railroad.

- b. **Comprehensive Business Automobile Liability Insurance.** A Commercial Automobile Liability insurance policy at the limits set forth herein in Schedule A covering liability arising out of the use of any motor vehicle in connection with the Agreement, including owned, leased, hired, and non-owned vehicles bearing, or, under the circumstances under which they are being used, required by the Motor Vehicle Laws of the State of New York to bear license plates. If the Agreement involves the removal of hazardous waste from the project site or otherwise transporting Hazardous Materials, pollution liability coverage for covered autos shall be provided.
- c. **Workers' Compensation. New York State Workers' Compensation** (including occupational disease) and Employer's Liability insurance coverage during the life of the Agreement for the benefit of the Contractor's and its subcontractors' employees as are required to be covered by the New York State Workers' Compensation Law.

In the event any of the work under the Agreement involves activity on or near a shoreline or on or near navigable waterways or when any part of the work under the Agreement is connected to water related activities, an endorsement to the Workers' Compensation policy or the Protection & Indemnity policy providing coverage for all of the Contractor's and its subcontractors' employees under the Jones Act and the US Longshore and Harbor Workers' Compensation Act will be required and shall be delivered to the University within three (3) business days of such request. A waiver of subrogation in favor of the Additional Insureds must be included on the policy. In addition, the Contractor shall otherwise fully comply with Section 5.06(3)g below.

Evidence of Workers' Compensation and Employer's Liability coverage must be provided to the University on forms specified by the Chairman of the New York State Workers' Compensation Board.

- d. **Disability Benefits.** Disability coverage during the life of the Agreement for the benefit of the Contractor's and its subcontractors' employees as are required to be covered by the New York State Disability Benefits Law.

Evidence of New York State Disability Benefits coverage must be provided to the University on forms specified by the Chairman of the New York State Workers' Compensation Board.

- e. **Umbrella and Excess Liability.** When the limits of the CGL, Auto, and/or Employers Liability policies procured are insufficient to meet the limits specified in Schedule A, the Contractor shall procure and maintain Commercial Umbrella and/or Excess Liability policies with limits in excess of the primary, provided, however, that the total amount of insurance coverage is at least equal to the requirements set forth above. Such policies shall follow the same form as the primary. Any insurance maintained by the University or Additional Insureds shall be considered in excess of and shall not contribute with any other insurance procured or maintained by the Contractor including primary, umbrella and excess liability regardless of the "other insurance" clause contained in either party's policy.
- f. **Contractor's Pollution Liability.** If the Agreement involves abatement, handling, removal, repair, replacement, enclosure, encapsulation and/or disposal of any pollutants, which includes but is not limited to, petroleum, petroleum products, Hazardous Materials or substances including asbestos, lead, mercury, PCBs, fungus and those as defined by applicable State and federal laws and regulations (collectively referred to as "Hazardous

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Activities”), the Contractor shall procure, or otherwise obtain through an approved subcontractor, and maintain in full force and effect throughout the term of the Agreement, from Notice to Proceed and for three years after Final Acceptance, Contractor’s Pollution Liability with limits as set forth in Schedule A, providing coverage for bodily injury and property damage, including loss of use of damaged property or of property that has not been physically injured. Such policy shall provide coverage for actual, alleged or threatened emission, discharge, dispersal, seepage, release or escape of pollutants, including any loss, cost or expense incurred as a result of any cleanup of pollutants or in the investigation, settlement or defense of any claim, suit, or proceedings against the University or Additional Insureds arising from the Contractor’s or its subcontractors’ work under the Agreement.

In addition, in the event the Contractor or any subcontractor is engaged in Hazardous Activities related to the Agreement, the Contractor or subcontractor shall, to the fullest extent permitted by law, hold harmless and indemnify the Additional Insureds and their trustees, officers, agents or employees, for any claims or liabilities in connection with illness or sickness arising from work performed, not performed, or which should have been performed. The Contractor shall have said hold-harmless and indemnification conditions stipulated in all contracts with subcontractors.

- g. **Marine General Liability, Protection & Indemnity, Hull & Machinery, Jones Act and United States Longshore and Harbor Workers’ Act Coverage.** In the event any of the work under the Agreement involves activity on or near a shoreline or on or near navigable waterways or when any part of the work under the Agreement is connected to water related activities (collectively referred to as “Marine Operations”), Marine General Liability, Protection & Indemnity and Hull and Machinery coverage is required. Hull and Machinery coverage shall be provided for the total value of the watercraft and equipment used. The Contractor shall obtain Marine General Liability and Protective and Indemnity Liability Insurance for all Marine Operations relating to the Agreement at the limits set forth herein in Schedule A. Any endorsements that eliminate or minimize coverage for claims related to the imposition of New York Labor Law are prohibited. Certificate of Liability Insurance must be provided that certifies the required coverage is in place and must be accompanied by an ACORD 855 form or its equivalent.
- h. **Railroad Protective Liability.** In the event any work under the Agreement involves activity on or within 50 ft. of railroad property or a railroad right-of-way, or requires entrance upon a railroad property or railroad right-of-way, or requires an assignment of a Railroad employee, the Contractor shall provide and maintain a Railroad Protective Liability (“RPL”) Insurance Policy in the amount required by the respective railroad as set forth herein in Schedule A. For purposes of this paragraph, a subway is also a railroad.

The RPL policy must name the Railroad as the Named Insured. No Additional Insureds may be listed on the RPL policy and the definition of “physical damage to property” must be amended to mean direct and accidental loss of or damage to “all property of any Named Insured and all property in any Named Insured’s care, custody or control.”

Evidence of RPL must be provided to the University on a Certificate of Insurance, and a detailed Binder pending issuance of the policy, or on an ISO-RIMA or equivalent form approved by the Railroad and meet any other requirements as specified by the Railroad and/or the University.”

**Section 5.07 Builder's Risk**

- (1) The Contractor shall procure and maintain, at its own cost and expense, until final acceptance of all work covered by this Agreement or until the Project has been turned over for use by the State University of New York, whichever event occurs earlier, a builder’s risk insurance policy covering all risks, with fire, extended coverage, vandalism and malicious mischief coverage. In the event the loss occurs at an occupied facility, the policy shall permit occupancy without the consent of the insurance company. The policy shall cover the cost of removing debris, including demolition as may be legally necessary by operation of any law, ordinance, or regulation, and property of the State held in their care, custody and/or control.
- (2) The policy shall be in an amount equal to the Project’s insurable value, i.e., the Contract consideration less the cost of the Contractor’s Performance and Labor and Material Bonds; the cost of trees, shrubbery, lawn grass, plants and the maintenance of the same; the cost of demolition; the cost of excavation; the cost of foundations, piers or other supports which are below the undersurface of the lowest basement floor, or where there is no

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basement, which are below the surface of the ground, concrete and masonry work; the cost of underground flues, pipes or wiring; the cost of earthmoving, grading and the cost of paving, roads, walks, parking lots or athletic fields; and the cost of bridges, tunnels, dams, piers, wharves, docks, retaining walls and radio and/or television towers and antennas.

- (3) The policy may contain a provision for a \$500 deductible for each loss to a Project having an insurable value of less than \$1,500,000 and a \$1,000 deductible for each loss to a Project having an insurable value of \$1,500,000 or more.
- (4) The University, the Contractor and its subcontractors, as their interests may appear, shall be named as the parties insured under said policy.
- (5) The Contractor shall have the sole responsibility to promptly report any loss to the insurer and/or its representatives and to furnish the latter with all necessary details relating to the occurrence of the loss and the amount thereof. The University, the Contractor and all subcontractors of the Contractor waive all rights, each against the others, for damages caused by fire or other perils covered by insurance provided under the terms of this Section, except such rights as they may have to the proceeds of insurance received; provided, however, this waiver shall not apply to any manufacturer, supplier or similar agent under any guarantee or warranty.
- (6) The Contractor shall not violate or permit to be violated any condition of such policy and shall at all times satisfy the fire safety requirements of the University and the insurance company issuing the same.
- (7) The procurement and maintenance of said policy shall in no way be construed or be deemed to relieve the Contractor from any of the obligations and risks imposed upon it by this Agreement or to be a limitation on the nature or extent of such obligations and risks.
- (8) Not less than thirty days prior to the expiration date or renewal date, the Contractor shall supply the University with an updated replacement certificate of insurance and endorsements. The Contractor shall advise the University of any letter or notification that cancels, materially changes, or non- renews the policy and Contractor shall require the insurance carrier(s) to copy the University on any letter or notification that cancels, materially changes, or non- renews the policy. Before the Contractor shall be entitled to have any progress payment rendered on account of the work which is to be insured pursuant to this Section, it shall furnish to the University a certificate in duplicate of the insurance herein required. Such insurance must be procured from an insurance carrier approved by the University, licensed or authorized to do business in the State of New York and rated at least "A-" by A.M. Best Company.

**Section 5.08 Effect of Procurement of Insurance**

Neither the procurement nor the maintenance of such insurance shall in any way affect or limit the obligations, responsibilities or liabilities of the Contractor hereunder.

**Section 5.09 No Third Party Rights**

Nothing in this Section or in this Agreement shall create or give to third parties, except the Dormitory Authority of the State of New York, the State of New York and the State University Construction Fund any claim or right of action against the Contractor, the Consultant, the State University of New York, the State University Construction Fund, the Dormitory Authority of the State of New York, or the State of New York and beyond such as may legally exist irrespective of this Section or this Agreement.

**Article VI**

**Minority and Women's Business Enterprises (MWBEs) / Equal Employment Opportunity (EEO) Provisions**

The University is required to implement the provisions of New York State Executive Law Article 15-A and 5 NYCRR Parts 142-145 ("MWBE Regulations") for all State contracts as defined therein, with a value (1) in excess of \$25,000 for labor, services, equipment, materials, or any combination of the foregoing or (2) in excess of \$100,000 for real property renovations and construction.

The requirements for the MWBE and EEO programs are set forth in "Exhibit A-1" which is attached hereto and made a part hereof, and shall be deemed to be inserted herein and the Contract shall be read and enforced as though it were



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included herein and, in the event any such provision is not inserted or is not correctly inserted, then, upon the application of either party, this Agreement shall forthwith be physically amended to make such insertion or correction.

**Article VII**  
**Provisions Required by Law**

**Section 7.01 Provisions Deemed Inserted**

Each and every provision required by law to be inserted in the Contract, including, but not limited to, the applicable provisions set forth in Exhibit "A" which is attached hereto and made a part hereof, shall be deemed to be inserted herein and the Contract shall be read and enforced as though it were included herein and, in the event any such provision is not inserted or is not correctly inserted, then, upon the application of either party, this Agreement shall forthwith be physically amended to make such insertion or correction.

**Section 7.02 Wage Rates**

The Contractor shall post the appropriate prevailing wage schedules in a conspicuous place at the construction site. The Department of Labor shall provide the Contractor with posters relating to prevailing wage rates and same shall be displayed by the Contractor in a conspicuous place at the construction site. The Contractor shall also distribute wallet cards, to be provided by the Department of Labor, to all workers engaged at the construction site containing information relating to wage rates and telephone numbers to call if a worker believes his or her rights are being violated. The Contractor shall provide each worker with a written notice, informing them of the applicable prevailing wage requirements, and the Contractor must obtain a signed statement or declaration from such worker attesting to the fact that he or she has been given this information. Further, the Contractor is required to keep certified copies of its payrolls at the construction site.

**Section 7.03 Governing Law**

This Agreement shall be governed, construed and enforced in accordance with the laws of New York State, excluding New York State's choice of law principles, in a court of competent jurisdiction, and all claims relating to or arising out of this Agreement or the breach thereof, whether sounding in contract, tort or otherwise, shall likewise be governed by the laws of New York State, excluding the New York choice of law principles, in a court of competent jurisdiction. Consultant agrees to submit itself to such courts' jurisdiction.

**Article VIII**  
**Vendor Responsibility**

- (1) The Contractor shall at all times during the Agreement term remain responsible. The Contractor shall provide the University with written notice as required by this Article of any issues impacting its responsibility, which shall minimally include updated responses to the it's filed vendor responsibility questionnaire. The Contractor agrees, if requested by the University, to present evidence of its continuing legal authority to do business in New York State, integrity, experience, ability, prior performance and organizational and financial capacity.
- (2) The University, at its sole discretion, reserves the right to suspend any or all activities under this Agreement, at any time, when the University discovers information that calls into question the responsibility of the Contractor. In the event of such suspension, the Contractor will be given written notice outlining the particulars of such suspension. Upon issuance of such notice, the Contractor must comply with the terms of the suspension order. Agreement activity may resume at such time as the University issues a written notice authorizing a resumption of performance under the Agreement.
- (3) Upon written notice to the Contractor, and a reasonable opportunity to be heard with appropriate University officials or staff, the Contractor may be terminated by the University at the Contractor's expense where the Contractor is determined by the University to be non-responsible. In such event, the University may complete the contractual requirements in any manner that the University may deem advisable and pursue available legal or equitable remedies for breach.

In no case shall termination of the Contract by the University be deemed a breach by the University thereof, nor shall the University be liable for any damages or lost profits or otherwise, which may be sustained by Contractor as a result of such termination.

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**Article IX**  
**Use of Service-Disabled Veteran-Owned Business Enterprises in Contract Performance**

Article 17-B of New York State Executive Law acknowledges that Service-Disabled Veteran-Owned Businesses (SDVOBs) strongly contribute to the economies of the State and the nation. As defenders of our nation and in recognition of their economic activity in doing business in New York State, the Contractor for the Project and Work defined in this Agreement, agrees to, at no additional cost to the University, fully comply and cooperate with the University's implementation of New York State Executive Law Article 17-B and provide opportunities for SDVOBs in the fulfillment of the requirements of this Agreement. SDVOBs can be readily identified on the directory of certified businesses at: [http://www.ogs.ny.gov/Core/docs/CertifiedNYS\\_SDVOB.pdf](http://www.ogs.ny.gov/Core/docs/CertifiedNYS_SDVOB.pdf).

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In accordance with the Chapter 17 of the Laws of 2023 certain University contracts are subject to review by the Office of the State Comptroller. As such a contract, the State shall have no liability under this Agreement and this Agreement is not valid, effective, or binding until it has been approved by the Office of the State Comptroller and filed in their office.

This Agreement may be amended only upon the mutual written consent of the Parties, and with the approval of the New York Attorney General and the Office of the State Comptroller if such approval is required.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the day and year first above written.

*Agency Certification:*

*In addition to the acceptance of this contract, I also certify that original copies of this signature page will be attached to all other exact copies of this contract.*

Contract Number: **\*Insert Contract Number\***

**\*Insert Contractor Name\***

**STATE UNIVERSITY OF NEW YORK AT BUFFALO**

Sign: \_\_\_\_\_ Date: \_\_\_\_\_

Sign: \_\_\_\_\_ Date: \_\_\_\_\_

Print: \_\_\_\_\_

Print: Tonga Pham

Title: \_\_\_\_\_

Title: Associate Vice President  
University Facilities

**APPROVED BY ATTORNEY GENERAL:**

**APPROVED BY OFFICE OF THE STATE  
COMPTROLLER:**

\_\_\_\_\_ Date: \_\_\_\_\_

\_\_\_\_\_ Date: \_\_\_\_\_

By:

By:



**ACKNOWLEDGMENTS**  
(ACKNOWLEDGMENT BY AN INDIVIDUAL)

\_\_\_\_\_  
Public

\_\_\_\_\_  
Notary

\_\_\_\_\_  
Public

\_\_\_\_\_  
Notary

Notary Public

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**Schedule I, II, III**

**SCHEDULE I**

**Unit Prices**

Refer to Section 4.04 of the Agreement for additional information.

<u>Work or Material</u> <u>Description</u>	<u>Amount in Words</u>	<u>Amount in Figures</u>
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**Insert information as appropriate or state "none"**

**SCHEDULE II**                      Allowance(s)

Refer to Section 4.05 of the Agreement for additional information. The amount(s) indicated below shall be included in the Total Bid amount and their total indicated on the Proposal in the space provided.

<u>Work or Material</u> <u>Description</u>	<u>Amount in Words</u>	<u>Amount in Figures</u>
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**Insert information as appropriate or state "none"**

**SCHEDULE III**                      Field Order Allowance

Refer to Section 4.05A of the Agreement for additional information. The amount indicated below shall be included in the Total Bid amount and indicated on the Proposal in the space provided

**Insert information as appropriate or state "none"**

\_\_\_\_\_  
(in words)

\_\_\_\_\_  
(in figures)

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**Schedule A**  
**Insurance Requirements**

Contract Number: \*insert contract number\*

All certificate(s) of insurance/ACORD Form must be submitted pursuant to Contract Article 5.06 and include the following information:

- For each insurance certificate, the name and NAIC number of issuing company, number of policy, with effective dates and deductibles, if applicable
- Policy limits consistent with the requirements listed below
- Certificate must disclose that the policies are on a primary and non-contributory basis
- The contract/project number assigned by the University
- Admitted Carriers must meet the following criteria: (1) AM Best Company rating of A- or greater, (2) financial score of VII or greater

Insurance Type	Per Occurrence	Per Aggregate	Forms
Workers Compensation	As required by NYS		Form C105.2 (Certificate of NYS Workers' Compensation Coverage) or the U-26.3 (State Insurance Fund Certificate)
Disability	As required by NYS		Form DB120.1 (Certificate of Insurance Coverage under the NYS Disability Benefits Law)
Commercial General Liability	Campus insert value	Campus insert value	ACORD 25 Certificate of Liability Insurance; and ACORD 855 Certificate of Liability Addendum
Automobile	\$1,000,000, combined single limit		ACORD 25 Certificate of Liability Insurance
Contractor's (or Subcontractor's) Pollution Liability	Campus insert value	Campus insert value	ACORD 25 Certificate of Liability Insurance
Builders Risk	Policy shall match the total contract value, or where appropriate - the value determined using the Builder Risk Insurance Breakdown		ACORD 25 Certificate of Liability Insurance
Campus insert additional insurance as required (i.e. Railroad, Marine)	Delete this row if no additional insurance is required		

Specific contract requirements for insurance may be found in section 5.06 of the Construction Agreement.

**DELETE THIS TEXT ONCE THE ABOVE TABLE IS COMPLETE:**

Insurance Limits are assigned based on the contract value, considering guidance from the Council of Contracting Agencies Insurance Guidelines and risk factors considered on a project-by-project basis.

Commercial General Liability

Certain projects may warrant increased insurance limits, when additional risks are present consult with campus counsel.

For contracts <\$10M \$2,000,000 occurrence, \$2,000,000 aggregate

For contracts \$10M to 50M \$5,000,000 occurrence, \$5,000,000 aggregate

For contracts > \$50M \$10,000,000 occurrence, \$10,000,000 aggregate

Contractor's (or subcontractor's) Pollution Liability (Environmental Liability)

Certain projects may warrant increased insurance limits, when additional risks are present consult with campus counsel.

For contracts <\$10M \$2,000,000 occurrence, \$2,000,000 aggregate

For contracts \$10M to 50M \$5,000,000 occurrence, \$5,000,000 aggregate

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*For contracts > \$50M                      \$10,000,000 occurrence, \$10,000,000 aggregate*

*If applicable, add to the table Railroad Protective Liability and/or Marine General Liability, Protection & Indemnity, Hull & Machinery, Jones Act and United States Longshore and Harbor Workers' Act Coverage*

**Additional Insureds for each liability insurance policy, including coverage for on-going and completed operations:**

- The People of the State of New York
- The State University of New York
- The Dormitory Authority of the State of New York
- The State University Construction Fund
- The Campus
- If applicable, Construction Manager
- If applicable, Railroad
- The officers, agents, and employees of those listed above
- If applicable, non-state landowner impacted by this work

Such policy shall be written on ISO Occurrence form CG 00 01 or a substitute form that is acceptable to the University, providing equivalent coverage.

**Guidance to Submit Insurance Certificates**

- Certificates must be signed
- Acord forms must be emailed directly by the agent or carrier
- Email certificates and other insurance related correspondence to \*insert campus email\*
- Include in the subject line the campus and contract number
- Please do not mail additional copies

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**Exhibit A**

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**Exhibit A-1**



## State University of New York

The parties to the attached contract, license, lease, amendment or other agreement of any kind (hereinafter, "contract") agree to be bound by the following clauses which are hereby made a part of the contract (the word "Contractor" herein refers to any party other than the State or State University of New York, whether a Contractor, licensor, licensee, lessor, lessee or any other party; the State University of New York shall hereinafter be referred to as "SUNY"):

1. **EXECUTORY CLAUSE.** In accordance with Section 41 of the State Finance Law, the State shall have no liability under this contract to the Contractor or to anyone else beyond funds appropriated and available for this contract.

2. **PROHIBITION AGAINST ASSIGNMENT.** In accordance with Section 138 of the State Finance Law, this contract may not be assigned by the Contractor or its right, title or interest therein assigned, transferred, conveyed, sublet or otherwise disposed of without the State's previous written consent, and attempts to do so are null and void. Notwithstanding the foregoing, such prior written consent of an assignment of a contract let pursuant to Article XI of the State Finance Law may be waived at the discretion of SUNY and with the concurrence of the State Comptroller where the original contract was subject to the State Comptroller's approval, where the assignment is due to a reorganization, merger or consolidation of the Contractor's business entity or enterprise. SUNY retains its right to approve an assignment and to require that any Contractor demonstrate its responsibility to do business with SUNY. The Contractor may, however, assign its right to receive payments without SUNY's prior written consent unless this contract concerns Certificates of Participation pursuant to Article 5-A of the State Finance Law.

3. **COMPTROLLER'S APPROVAL.** (a) In accordance with Section 112 of the State Finance Law, the State Comptroller's approval is required for the following contracts: (i) goods, services, construction, and construction-related services for State University hospital or healthcare facilities which exceed \$150,000; (ii) purchases utilizing an Office of General Services (OGS) centralized contract which exceed \$200,000 (iii) goods, services, construction, and construction-related services not described in (i) or (ii) and which exceed \$75,000;

(b) If this contract exceeds the threshold amounts listed above in Paragraph 3(a), or, if this is an amendment for any amount to a contract which, as so amended, exceeds said threshold amounts, or if, by this contract, the State agrees to give something other than money when the value or reasonably estimated value of such consideration exceeds \$25,000, it shall not be valid, effective or binding upon the State, and the State shall bear no liability, until it has been approved by the State Comptroller and filed in his or her office.

4. **WORKERS' COMPENSATION BENEFITS.** In accordance with Section 142 of the State Finance Law, this contract shall be void and of no force and effect unless the Contractor shall provide and maintain coverage during the life of this contract for the benefit of such employees as are required to be covered by the provisions of the Workers' Compensation Law.

5. **NON-DISCRIMINATION REQUIREMENTS.** To the extent required by Article 15 of the Executive Law (also known as the Human Rights Law) and all other State and Federal statutory and constitutional non-discrimination provisions, the Contractor will not discriminate against any employee or applicant for employment, nor subject any individual to harassment, because of age, race, creed, color, national origin, citizenship or immigration status, sexual orientation, gender identity or expression, military status, sex, disability, predisposing genetic characteristics, familial status, marital status, or domestic violence victim status or because the individual has opposed any practices forbidden under the Human Rights Law or has filed a complaint, testified, or assisted in any proceeding under the Human Rights Law. Furthermore, in accordance with Section 220-e of the Labor Law, if this is a contract for the construction, alteration or repair of any public building or public work or for the manufacture, sale or distribution of materials, equipment or supplies, and to the extent that this contract shall be performed within the State of New York, Contractor agrees that neither it nor its subcontractors shall, by reason of race, creed, color, disability, sex, or national origin: (a) discriminate in hiring against any New York State citizen who is qualified and available to perform the work; or (b) discriminate against or intimidate any employee hired for the performance of work under this contract. If this is a building service contract as defined in Section 230 of the Labor Law, then, in accordance with Section 239 thereof, Contractor agrees that neither it nor its subcontractors shall by reason of race, creed, color, national origin, age, sex or disability: (a) discriminate in hiring against any New York State citizen who is qualified and available to perform the work; or (b) discriminate against or intimidate any employee hired for the performance of work under this contract. Contractor is subject to fines of \$50.00 per person per day for any violation of Section 220-e or Section 239 as well as possible termination of this contract and forfeiture of all moneys due hereunder for a second or subsequent violation

6. **WAGE AND HOURS PROVISIONS.** If this is a public work contract covered by Article 8 of the Labor Law or a building service contract covered by Article 9 thereof, neither Contractor's employees nor the employees of its subcontractors may be required or permitted to work more than the number of hours or days stated in said statutes, except as otherwise provided in the Labor Law and as set forth in prevailing wage and supplement schedules issued by the State Labor Department. Furthermore, Contractor and its subcontractors must pay at least the prevailing wage rate and pay or provide the prevailing supplements, including the premium rates for overtime pay, as determined by the State Labor Department in accordance with the Labor Law. Additionally, effective April 28, 2008, if this is a public work contract covered by Article 8 of the Labor Law, the Contractor understands and agrees that the filing of payrolls in a manner consistent with Subdivision 3-a of Section 220 of the Labor Law shall be a condition precedent to payment by the State of any State- approved sums due and owing for work done upon the project.

7. **NON-COLLUSIVE BIDDING CERTIFICATION.** In accordance with Section 139-d of the State Finance Law, if this contract was awarded based upon the submission of competitive bids, Contractor affirms, under penalty of perjury, that its bid was arrived at independently and without collusion aimed at restricting competition. Contractor further affirms that, at the time Contractor submitted its bid, an authorized and responsible person executed and delivered to SUNY a non-collusive bidding certification on Contractor's behalf.

8. **INTERNATIONAL BOYCOTT PROHIBITION.** In accordance with Section 220-f of the Labor Law and Section 139-h of the State Finance Law, if this contract exceeds \$5,000, the Contractor agrees, as a material condition of the contract, that neither the Contractor nor any substantially owned or affiliated person, firm, partnership or corporation has participated, is participating, or shall participate in an international boycott in violation of the federal Export Administration Act of 1979 (50 USC App. Sections 2401 *et seq.*) or regulations thereunder. If such Contractor, or any of the aforesaid affiliates of Contractor, is convicted or is otherwise found to have violated said laws or regulations upon the final determination of the United States Commerce Department or any other appropriate agency of the United States subsequent to the contract's execution, such contract, amendment or modification thereto shall be rendered forfeit and void. The Contractor shall so notify the State Comptroller within five (5) business days of such conviction, determination or disposition of appeal (2 NYCRR § 105.4).

9. **SET-OFF RIGHTS.** The State shall have all of its common law, equitable and statutory rights of set-off. These rights shall include, but not be limited to, the State's option to withhold for the purposes of set-off any moneys due to the Contractor under this contract up to any amounts due and owing to the State with regard to this contract, any other contract with any State department or agency, including any contract for a term commencing prior to the term of this contract, plus any amounts due and owing to the State for any other reason including, without limitation, tax delinquencies, fee delinquencies or monetary penalties relative thereto. The State shall exercise its set-off rights in accordance with normal State practices including, in cases of set-off pursuant to an audit, the finalization of such audit by SUNY, its representatives, or the State Comptroller.

10. **RECORDS.** The Contractor shall establish and maintain complete and accurate books, records, documents, accounts and other evidence directly pertinent to performance under this contract (hereinafter, collectively, "the Records"). The Records must be kept for the balance of the calendar year in which they were made and for six (6) additional years thereafter. The State Comptroller, the Attorney General and any other person or entity authorized to conduct an examination, as well as SUNY and any other agencies involved in this contract, shall have access to the Records during normal business hours at an office of the Contractor within the State of New York or, if no such office is available, at a mutually agreeable and reasonable venue within the State, for the term specified above for the purposes of inspection, auditing and copying. SUNY shall take reasonable steps to protect from public disclosure any of the Records which are exempt from disclosure under Section 87 of the Public Officers Law (the "Statute") provided that: (i) the Contractor shall timely inform an appropriate SUNY official, in writing, that said Records should not be disclosed; and (ii) said Records shall be sufficiently identified; and (iii) designation of said Records as exempt under the Statute is reasonable. Nothing contained herein shall diminish, or in any way adversely affect, SUNY's or the State's right to discovery in any pending or future litigation.

11. **IDENTIFYING INFORMATION AND PRIVACY NOTIFICATION.**

(a) Identification Number(s). Every invoice or New York State Claim for Payment submitted to SUNY by a payee, for payment for the sale of goods or services or for transactions (e.g., leases, easements, licenses, etc.) related to real or personal property must include the payee's identification number. The number is any or all of the following: (i) the payee's Federal employer identification number, (ii) the payee's Federal social security number, and/or (iii) the payee's Vendor Identification Number assigned by the Statewide Financial System. Failure to include such number or numbers may delay payment. Where the payee does not have such number or numbers, the payee, on its invoice or Claim for Payment, must give the reason or reasons why the payee does not have such number or numbers.

(b) Privacy Notification. (1) The authority to request the above personal information from a seller of goods or services or a lessor of real or personal property, and the authority to maintain such information, is found in Section 5 of the State Tax Law. Disclosure of this information by the seller or lessor to SUNY or the State is mandatory. The principal purpose for which the information is collected is to enable the State to identify individuals, businesses and others who have been delinquent in filing tax returns or may have understated their tax liabilities and to generally identify persons affected by the taxes administered by the Commissioner of Taxation and Finance. The information will be used for tax administration purposes and for any other purpose authorized by law. (2) The personal information is requested by the purchasing unit of SUNY contracting to purchase the goods or services or lease the real or personal property covered by this contract or lease. The information is maintained in the Statewide Financial System by the Vendor Management Unit within the Bureau of State Expenditures, Office of the State Comptroller, 110 State Street, Albany, New York 12236.

12. **EQUAL EMPLOYMENT OPPORTUNITIES FOR MINORITIES AND WOMEN.**

In accordance with Section 312 of the Executive Law and 5 NYCRR Part 143, if this

contract is: (i) a written agreement or purchase order instrument, providing for a total expenditure in excess of \$25,000.00, whereby a contracting agency is committed to expend or does expend funds in return for labor, services, supplies, equipment, materials or any combination of the foregoing, to be performed for, or rendered or furnished to the contracting agency; or (ii) a written agreement in excess of \$100,000.00 whereby a contracting agency is committed to expend or does expend funds for the acquisition, construction, demolition, replacement, major repair or renovation of real property and improvements thereon; or (iii) a written agreement in excess of \$100,000.00 whereby the owner of a State assisted housing project is committed to expend or does expend funds for the acquisition, construction, demolition, replacement, major repair or renovation of real property and improvements thereon for such project, then the following shall apply and by signing this agreement the Contractor certifies and affirms that it is Contractor's equal employment opportunity policy that:

(a) The Contractor will not discriminate against employees or applicants for employment because of race, creed, color, national origin, sex, age, disability or marital status, shall make and document its conscientious and active efforts to employ and utilize minority group members and women in its workforce on State contracts and will undertake or continue existing programs of affirmative action to ensure that minority group members and women are afforded equal employment opportunities without discrimination. Affirmative action shall mean recruitment, employment, job assignment, promotion, upgrading, demotion, transfer, layoff, or termination and rates of pay or other forms of compensation;

(b) at SUNY's request, Contractor shall request each employment agency, labor union, or authorized representative of workers with which it has a collective bargaining or other agreement or understanding, to furnish a written statement that such employment agency, labor union or representative will not discriminate on the basis of race, creed, color, national origin, sex, age, disability or marital status and that such union or representative will affirmatively cooperate in the implementation of the Contractor's obligations herein; and

(c) the Contractor shall state, in all solicitations or advertisements for employees, that, in the performance of the State contract, all qualified applicants will be afforded equal employment opportunities without discrimination because of race, creed, color, national origin, sex, age, disability or marital status.

Contractor will include the provisions of "a," "b," and "c" above, in every subcontract over \$25,000.00 for the construction, demolition, replacement, major repair, renovation, planning or design of real property and improvements thereon (the "Work") except where the Work is for the beneficial use of the Contractor. Section 312 does not apply to: (i) work, goods or services unrelated to this contract; or (ii) employment outside New York State. The State shall consider compliance by a contractor or sub-contractor with the requirements of any federal law concerning equal employment opportunity which effectuates the purpose of this clause. SUNY shall determine whether the imposition of the requirements of the provisions hereof duplicate or conflict with any such federal law and if such duplication or conflict exists, SUNY shall waive the applicability of Section 312 to the extent of such duplication or conflict. Contractor will comply with all duly promulgated and lawful rules and regulations of the Department of Economic Development's Division of Minority and Women's Business Development pertaining hereto.

**13. CONFLICTING TERMS.** In the event of a conflict between the terms of the contract (including any and all attachments thereto and amendments thereof) and the terms of this Exhibit A, the terms of this Exhibit A shall control.

**14. GOVERNING LAW.** This contract shall be governed by the laws of the State of New York except where the Federal supremacy clause requires otherwise.

**15. LATE PAYMENT.** Timeliness of payment and any interest to be paid to Contractor for late payment shall be governed by Article 11-A of the State Finance Law to the extent required by law.

**16. NO ARBITRATION.** Disputes involving this contract, including the breach or alleged breach thereof, may not be submitted to binding arbitration (except where statutorily authorized) but must, instead, be heard in a court of competent jurisdiction of the State of New York.

**17. SERVICE OF PROCESS.** In addition to the methods of service allowed by the State Civil Practice Law & Rules ("CPLR"), Contractor hereby consents to service of process upon it by registered or certified mail, return receipt requested. Service hereunder shall be complete upon Contractor's actual receipt of process or upon the State's receipt of the return thereof by the United States Postal Service as refused or undeliverable. Contractor must promptly notify the State, in writing, of each and every change of address to which service of process can be made. Service by the State to the last known address shall be sufficient. Contractor will have thirty (30) calendar days after service hereunder is complete in which to respond.

**18. PROHIBITION ON PURCHASE OF TROPICAL HARDWOODS.** The Contractor certifies and warrants that all wood products to be used under this contract award will be in accordance with, but not limited to, the specifications and provisions of State Finance Law §165 (Use of Tropical Hardwoods), which prohibits purchase and use of tropical hardwoods, unless specifically exempted, by the State or any governmental agency or political subdivision or public benefit corporation. Qualification for an exemption under this law will be the responsibility of the contractor to establish to meet with the approval of the State.

In addition, when any portion of this contract involving the use of woods, whether supply or installation, is to be performed by any subcontractor, the prime Contractor will indicate and certify in the submitted bid proposal that the subcontractor has been informed and is in compliance with specifications and provisions regarding use of tropical hardwoods as detailed in Section 165 of the State Finance Law. Any such use must meet with the approval of the State, otherwise, the bid may not be considered responsive. Under bidder certifications, proof of qualification for exemption will be the responsibility of the Contractor to meet with the approval of the State.

**19. MACBRIDE FAIR EMPLOYMENT PRINCIPLES.** In accordance with the MacBride Fair Employment Principles (Chapter 807 of the Laws of 1992), the Contractor hereby stipulates that the Contractor either (a) has no business operations in Northern Ireland, or (b) shall take lawful steps in good faith to conduct any business operations in Northern Ireland in accordance with the MacBride Fair Employment Principles (as described in Section 165 of the New York State Finance Law), and shall permit independent monitoring of compliance with such principles.

**20. OMNIBUS PROCUREMENT ACT OF 1992.**

It is the policy of New York State to maximize opportunities for the participation of New York State business enterprises, including minority and women-owned business enterprises as bidders, subcontractors and suppliers on its procurement contracts.

Information on the availability of New York State subcontractors and suppliers is available from:

NYS Department of Economic Development  
Division for Small Business and Technology Development  
625 Broadway  
Albany, NY 12245  
Telephone: 518-292-5100

A directory of certified minority and women-owned business enterprises is available from:

NYS Department of Economic Development  
Division of Minority and Women's Business Development  
633 Third Avenue 33<sup>rd</sup> Floor  
New York, NY 10017  
646-846-7364  
email: [mwbebbusinessdev@esd.ny.gov](mailto:mwbebbusinessdev@esd.ny.gov)  
<https://ny.newnycontracts.com/FrontEnd/searchcertifieddirectory.asp>

The Omnibus Procurement Act of 1992 (Chapter 844 of the Laws of 1992, codified in State Finance Law § 139-i and Public Authorities Law § 2879(3)(n)-(p)) requires that by signing this bid proposal or contract, as applicable, Contractors certify that whenever the total bid amount is greater than \$1 million:

(a) The Contractor has made reasonable efforts to encourage the participation of New York State Business Enterprises as suppliers and subcontractors, including certified minority and women-owned business enterprises, on this project, and has retained the documentation of these efforts to be provided upon request to SUNY;

(b) The Contractor has complied with the Federal Equal Employment Opportunity Act of 1972 (P.L. 92-261), as amended;

(c) The Contractor agrees to make reasonable efforts to provide notification to New York State residents of employment opportunities on this project through listing any such positions with the Job Service Division of the New York State Department of Labor, or providing such notification in such manner as is consistent with existing collective bargaining contracts or agreements. The Contractor agrees to document these efforts and to provide said documentation to the State upon request; and

(d) The Contractor acknowledges notice that the State may seek to obtain offset credits from foreign countries as a result of this contract and agrees to cooperate with the State in these efforts.

**21. RECIPROCITY AND SANCTIONS PROVISIONS.** Bidders are hereby notified that if their principal place of business is located in a country, nation, province, state or political subdivision that penalizes New York State vendors, and if the goods or services they offer will be substantially produced or performed outside New York State, the Omnibus Procurement Act of 1994 and 2000 amendments (Chapter 684 and Chapter 383, respectively, codified in State Finance Law § 165(6) and Public Authorities Law § 2879(5))



require that they be denied contracts which they would otherwise obtain.

NOTE: As of May 2023, the list of discriminatory jurisdictions subject to this provision includes the states of South Carolina, Alaska, West Virginia, Wyoming, Louisiana and Hawaii.

**22. COMPLIANCE WITH BREACH NOTIFICATION AND DATA SECURITY LAWS.** Contractor shall comply with the provisions of the New York State Information Security Breach and Notification Act (General Business Law § 899-aa, § 899-bb, and State Technology Law § 208).

**23. COMPLIANCE WITH CONSULTANT DISCLOSURE LAW.** If this is a contract for consulting services, defined for purposes of this requirement to include analysis, evaluation, research, training, data processing, computer programming, engineering, environmental health and mental health services, accounting, auditing, paralegal, legal or similar services, then in accordance with Section 163(4)(g) of the State Finance Law (as amended by Chapter 10 of the Laws of 2006), the Contractor shall timely, accurately and properly comply with the requirement to submit an annual employment report for the contract to SUNY, the Department of Civil Service and the State Comptroller.

**24. PURCHASES OF APPAREL AND SPORTS EQUIPMENT.** In accordance with State Finance Law Section 165(7), SUNY may determine that a bidder on a contract for the purchase of apparel or sports equipment is not a responsible bidder as defined in State Finance Law Section 163 based on (a) the labor standards applicable to the manufacture of the apparel or sports equipment, including employee compensation, working conditions, employee rights to form unions and the use of child labor; or (b) bidder's failure to provide information sufficient for SUNY to determine the labor conditions applicable to the manufacture of the apparel or sports equipment.

**25. PROCUREMENT LOBBYING.** To the extent this contract is a "procurement contract" as defined by State Finance Law §§ 139-j and 139-k, by signing this contract the Contractor certifies and affirms that all disclosures made in accordance with State Finance Law §§ 139-j and 139-k are complete, true and accurate. In the event such certification is found to be intentionally false or intentionally incomplete, the State may terminate the contract by providing written notification to the Contractor in accordance with the terms of the contract.

**26. CERTIFICATION OF REGISTRATION TO COLLECT SALES AND COMPENSATING USE TAX BY CERTAIN STATE CONTRACTORS, AFFILIATES AND SUBCONTRACTORS.** To the extent this contract is a contract as defined by Tax Law § 5-a, if the Contractor fails to make the certification required by Tax Law § 5-a or if

during the term of the contract, the Department of Taxation and Finance or SUNY discovers that the certification, made under penalty of perjury, is false, then such failure to file or false certification shall be a material breach of this contract and this contract may be terminated, by providing written notification to the Contractor in accordance with the terms of the contract, if SUNY determines that such action is in the best interests of the State.

**27. IRAN DIVESTMENT ACT.** By entering into this contract, Contractor certifies in accordance with State Finance Law §165-a that it is not on the "Entities Determined to be Non-Responsive Bidders/Offers pursuant to the New York State Iran Divestment Act of 2012" ("Prohibited Entities List") posted at: <https://ogs.ny.gov/iran-divestment-act-2012>.

Contractor further certifies that it will not utilize on this contract any subcontractor that is identified on the Prohibited Entities List. Contractor agrees that should it seek to renew or extend this contract, it must provide the same certification at the time the contract is renewed or extended. Contractor also agrees that any proposed Assignee of this contract will be required to certify that it is not on the Prohibited Entities List before the contract assignment will be approved by the State.

During the term of the contract, should SUNY receive information that a person (as defined in State Finance Law §165-a) is in violation of the above-referenced certifications, SUNY will review such information and offer the person an opportunity to respond. If the person fails to demonstrate that it has ceased its engagement in the investment activity which is in violation of the Act within 90 days after the determination of such violation, then SUNY shall take such action as may be appropriate and provided for by law, rule, or contract, including, but not limited to, imposing sanctions, seeking compliance, recovering damages, or declaring the Contractor in default.

SUNY reserves the right to reject any bid, request for assignment, renewal or extension for an entity that appears on the Prohibited Entities List prior to the award, assignment, renewal or extension of a contract, and to pursue a responsibility review with respect to any entity that is awarded a contract and appears on the Prohibited Entities list after contract award.

**28. ADMISSIBILITY OF REPRODUCTION OF CONTRACT.** Notwithstanding the best evidence rule or any other legal principle or rule of evidence to the contrary, the Contractor acknowledges and agrees that it waives any and all objections to the admissibility into evidence at any court proceeding or to the use at any examination before trial of an electronic reproduction of this contract, in the form approved by the State Comptroller, if such approval was required, regardless of whether the original of said contract is in existence.

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**THE FOLLOWING PROVISIONS SHALL APPLY ONLY TO THOSE CONTRACTS TO WHICH A HOSPITAL OR OTHER HEALTH SERVICE FACILITY IS A PARTY**

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29. Notwithstanding any other provision in this contract, the hospital or other health service facility remains responsible for insuring that any service provided pursuant to this contract complies with all pertinent provisions of Federal, state and local statutes, rules and regulations. In the foregoing sentence, the word "service" shall be construed to refer to the health care service rendered by the hospital or other health service facility.

30. (a) In accordance with the 1980 Omnibus Reconciliation Act (Public Law 96-499), Contractor hereby agrees that until the expiration of four years after the furnishing of services under this agreement, Contractor shall make available upon written request to the Secretary of Health and Human Services, or upon request, to the Comptroller General of the United States or any of their duly authorized representatives, copies of this contract, books, documents and records of the Contractor that are necessary to certify the nature and extent of the costs hereunder.

(b) If Contractor carries out any of the duties of the contract hereunder, through a subcontract having a value or cost of \$10,000 or more over a twelve-month period, such subcontract shall contain a clause to the effect that, until the expiration of four years after the furnishing of such services pursuant to such subcontract, the subcontractor shall make available upon written request to the Secretary of Health and Human Services or upon request to the Comptroller General of the United States, or any of their duly authorized representatives, copies of the subcontract and books, documents and records of the subcontractor that are necessary to verify the nature and extent of the costs of such subcontract.

(c) The provisions of this section shall apply only to such contracts as are within the definition established by the Health Care Financing Administration, as may be amended or modified from time to time.

31. **Hospital Retained Authority:** Hospital Retained Authority: The Hospital retains direct, independent authority over the appointment and/or dismissal, in its sole discretion, of the facility's management level employees (including but not limited to, the Facility/Service Administrator/Director, the Medical Director, the Director of Nursing, the Chief Executive Officer, the Chief Financial Officer and the Chief Operating Officer) and all licensed or certified health care staff. The Hospital retains the right to adopt and approve, at its sole discretion, the facility's operating and capital budgets. The Hospital retains independent control over and physical possession of the facility's books and records. The Hospital retains independent control over and physical possession of the facility's operating policies and procedures. The Hospital retains full authority and responsibility for, and control over, the operations and management of the facility. The Hospital retains the right and authority to independently adopt, approve and enforce, in its sole discretion, policies affecting the facility's delivery of health care services. The Hospital retains the right to independently adopt, approve and enforce, at its sole discretion, the disposition of assets and authority to incur debts. The Hospital retains the right to approve, at its sole discretion, contracts for administrative services, management and/or clinical services. The Hospital retains the right to approve, at its sole discretion, any facility debt. The Hospital retains the right to approve, at its sole discretion, settlements of administrative proceeding or litigation to which the facility is a party. No powers specifically reserved to the Hospital may be delegated to, or shared by, the Contractor or any other person. In addition, if there is any disagreement between the parties to this Agreement regarding control between the Hospital and the Contractor, the terms of this Section shall control.

**1. DEFINITIONS.** The following terms shall be defined in accordance with Section 310 of the Executive Law:

**STATE CONTRACT** herein referred to as "State Contract", shall mean: (a) a written agreement or purchase order instrument, providing for a total expenditure in excess of twenty-five thousand dollars (\$25,000.00), whereby the State University of New York ("University") is committed to expend or does expend funds in return for labor, services including but not limited to legal, financial and other professional services, supplies, equipment, materials or a combination of the foregoing, to be performed for, or rendered or furnished to the University; (b) a written agreement in excess of one hundred thousand dollars (\$100,000.00) whereby the University is committed to expend or does expend funds for the acquisition, construction, demolition, replacement, major repair or renovation of real property and improvements thereon; (c) and (d) a written agreement in excess of one hundred thousand dollars (\$100,000.00) whereby the University as an owner of a state assisted housing project is committed to expend or does expend funds for the acquisition, construction, demolition, replacement, major repair or renovation of real property and improvements thereon for such project.

**SUBCONTRACT** herein referred to as "Subcontract", shall mean any agreement for a total expenditure in excess of \$25,000 providing for services, including non-staffing expenditures, supplies or materials of any kind between a State agency and a prime contractor, in which a portion of the prime contractor's obligation under the State contract is undertaken

or assumed by a business enterprise not controlled by the prime contractor.

**WOMEN-OWNED BUSINESS ENTERPRISE** herein referred to as "WBE", shall mean a business enterprise, including a sole proprietorship, partnership or corporation that is: (a) at least fifty-one percent (51%) owned by one or more United States citizens or permanent resident aliens who are women; (b) an enterprise in which the ownership interest of such women is real, substantial and continuing; (c) an enterprise in which such women ownership has and exercises the authority to control independently the day-to-day business decisions of the enterprise; (d) an enterprise authorized to do business in this state and independently owned and operated; (e) an enterprise owned by an individual or individuals, whose ownership, control and operation are relied upon for certification, with a personal net worth that does not exceed fifteen million dollars (\$15,000,000), as adjusted annually on the first of January for inflation according to the consumer price index of the previous year; and (f) an enterprise that is a small business pursuant to subdivision twenty of this section.

A firm owned by a minority group member who is also a woman may be certified as a minority-owned business enterprise, a women-owned business enterprise, or both, and may be counted towards either a minority-owned business enterprise goal or a women-owned business enterprise goal, in regard to any Contract or any goal, set by an agency or authority, but such participation may not be counted towards both such goals. Such an enterprise's participation in a Contract may not be divided between the minority-owned

business enterprise goal and the women-owned business enterprise goal.

**MINORITY-OWNED BUSINESS ENTERPRISE** herein referred to as "MBE", shall mean a business enterprise, including a sole proprietorship, partnership or corporation that is: (a) at least fifty-one percent (51%) owned by one or more minority group members; (b) an enterprise in which such minority ownership is real, substantial and continuing; (c) an enterprise in which such minority ownership has and exercises the authority to control independently the day-to-day business decisions of the enterprise; (d) an enterprise authorized to do business in this state and independently owned and operated; (e) an enterprise owned by an individual or individuals, whose ownership, control and operation are relied upon for certification, with a personal net worth that does not exceed fifteen million dollars (\$15,000,000.00), as adjusted annually on the first of January for inflation according to the consumer price index of the previous year; and (f) an enterprise that is a small business pursuant to subdivision twenty of this section.

**MINORITY GROUP MEMBER** shall mean a United States citizen or permanent resident alien who is and can demonstrate membership in one of the following groups: (a) Black persons having origins in any of the Black African racial groups; (b) Hispanic persons of Mexican, Puerto Rican, Dominican, Cuban, Central or South American of either Indian or Hispanic origin, regardless of race; (c) Native American or Alaskan native persons having origins in any of the original peoples of North America. (d) Asian and Pacific Islander persons having origins in any of the Far East countries, South East

Asia, the Indian Subcontinent or Pacific Islands.

**CERTIFIED ENTERPRISE OR BUSINESS** shall mean a business verified as a minority or women-owned business enterprise pursuant to section 314 of the Executive Law. A business enterprise which has been approved by the New York Division of Minority & Women Business Development ("DMWBD") for minority or women-owned enterprise status subsequent to verification that the business enterprise is owned, operated, and controlled by minority group members or women, and that also meets the financial requirements set forth in the regulations.

**2. TERMS.** The parties to the attached State Contract agree to be bound by the following provisions which are made a part hereof (the word "Contractor" herein refers to any party other than the University:

1(a) Contractor and its Subcontractors shall undertake or continue existing programs of affirmative action to ensure that minority group members and women are afforded equal employment opportunities without discrimination. For these purposes, affirmative action shall apply in the areas of recruitment, employment, job assignment, promotion, upgrading, demotion, transfer, layoff, or termination and rates of pay or other forms of compensation.

(b) Prior to the award of a State Contract, the Contractor shall submit an equal employment opportunity (EEO) policy statement to the University within the time frame established by the University.

(c) As part of the Contractor's EEO policy statement, the Contractor, as a precondition to entering into a valid and binding State Contract, shall agree to the following in the performance of the State Contract: (i) The Contractor will not discriminate against any employee or applicant for

employment, will undertake or continue existing programs of affirmative action to ensure that minority group members and women are afforded equal employment opportunities without discrimination, and shall make and document its conscientious and active efforts to employ and utilize minority group members and women in its work force on State Contracts; (ii) The Contractor shall state in all solicitations or advertisements for employees that, in the performance of the State Contract, all qualified applicants will be afforded equal employment opportunities without discrimination; (iii) At the request of the University the Contractor shall request each employment agency, labor union, or authorized representative of workers with which it has a collective bargaining or other agreement or understanding, to furnish a written statement that such employment agency, labor union, or representative will not discriminate, and that such union or representative will affirmatively cooperate in the implementation of the Contractor's obligations herein.

(d) Form 108 - Staffing Plan To ensure compliance with this Section, the Contractor shall submit a staffing plan to document the composition of the proposed workforce to be utilized in the performance of the Contract by the specified categories listed, including ethnic background, gender, and Federal occupational categories. Contractors shall complete the Staffing plan form and submit it as part of their bid or proposal or within a reasonable time, but no later than the time of award of the contract.

(e) Form 112 - Workforce Employment Utilization Report ("Workforce Report")

(i) Once a contract has been awarded and during the term of Contract, Contractor is responsible for updating and providing notice to SUNY of any changes to the previously submitted Staffing Plan. This information is to be submitted on a

quarterly basis during the term of the contract to report the actual workforce utilized in the performance of the contract by the specified categories listed including ethnic background, gender, and Federal occupational categories. The Workforce Report must be submitted to report this information.

(ii) Separate forms shall be completed by Contractor and any subcontractor performing work on the Contract.

(iii) In limited instances, Contractor may not be able to separate out the workforce utilized in the performance of the Contract from Contractor's and/or

subcontractor's total workforce. When a separation can be made, Contractor shall submit the Workforce Report and indicate that the information provided related to the actual workforce utilized on the Contract. When the workforce to be utilized on the contract cannot be separated out from Contractor's and/or subcontractor's total workforce, Contractor shall submit the Workforce Report and indicate that the information provided is Contractor's total workforce during the subject time frame, not limited to work specifically under the contract.

(f) Contractor shall comply with the provisions of the Human Rights Law, all other State and Federal statutory and constitutional non-discrimination provisions. Contractor and subcontractors shall not discriminate against any employee or applicant for employment because of race, creed (religion), color, sex, national origin, sexual orientation, military status, age, disability, predisposing genetic characteristic, marital status or domestic violence victim status, and shall also follow the requirements of the Human Rights Law with regard to non-discrimination on the basis of prior criminal conviction and prior arrest.



(g) The Contractor shall include the provisions of this section in every Subcontract in such a manner that the requirements of the provisions will be binding upon each Subcontractor as to work in connection with the State Contract, including the requirement that Subcontractors shall undertake or continue existing programs of affirmative action to ensure that minority group members and women are afforded equal employment opportunities without discrimination, and, when requested, provide to the Contractor information on the ethnic background, gender, and Federal occupational categories of the employees to be utilized on the State Contract.

(h) To ensure compliance with the requirements of this paragraph, the University shall inquire of a Contractor whether the work force to be utilized in the performance of the State Contract can be separated out from the Contractor's and/or Subcontractors' total work force and where the work of the State Contract is to be performed. For Contractors who are unable to separate the portion of their work force which will be utilized for the performance of this State Contract, Contractor shall provide reports describing its entire work force by the specified ethnic background, gender, and Federal Occupational Categories, or other appropriate categories which the agency may specify.

(i) The University may require the Contractor and any Subcontractor to submit compliance reports, pursuant to the regulations relating to their operations and implementation of their affirmative action or equal employment opportunity program in effect as of the date the State Contract is executed.

(j) If a Contractor or Subcontractor does not have an existing affirmative action program, the University may provide to the Contractor or Subcontractor a model plan of an affirmative action program. Upon request, the Director of

DMWBD shall provide a contracting agency with a model plan of an affirmative action program.

(k) Upon request, DMWBD shall provide the University with information on specific recruitment sources for minority group members and woman, and contracting agencies shall make such information available to Contractors

3. Contractor must provide the names, addresses and federal identification numbers of certified minority- and women-owned business enterprises which the Contractor intends to use to perform the State Contract and a description of the Contract scope of work which the Contractor intends to structure to increase the participation by Certified minority- and/or women-owned business enterprises on the State Contract, and the estimated or, if known, actual dollar amounts to be paid to and performance dates of each component of a State Contract which the Contractor intends to be performed by a certified minority- or woman-owned business enterprise. In the event the Contractor responding to University solicitation is joint venture, teaming agreement, or other similar arrangement that includes a minority- and women owned business enterprise, the Contractor must submit for review and approval: i. the name, address, telephone number and federal identification of each partner or party to the agreement; ii. the federal identification number of the joint venture or entity established to respond to the solicitation, if applicable; iii. A copy of the joint venture, teaming or other similar arrangement which describes the percentage of interest owned by each party to the agreement and the value added by each party; iv. A copy of the mentor-protégé agreement between the parties, if applicable, and if not described in the joint venture, teaming agreement, or other similar arrangement.

**4. PARTICIPATION BY MINORITY GROUP MEMBERS AND WOMEN.** The University shall determine whether Contractor has made conscientious and active efforts to employ and utilize minority group members and women to perform this State Contract based upon an analysis of the following factors:

(a) Whether Contractor established and maintained a current list of recruitment sources for minority group members and women, and whether Contractor provided written notification to such recruitment sources that contractor had employment opportunities at the time such opportunities became available.

(b) Whether Contractor sent letters to recruiting sources, labor unions, or authorized representatives of workers with which contractor has a collective bargaining or other agreement or understanding requesting assistance in locating minority group members and women for employment.

(c) Whether Contractor disseminated its EEO policy by including it in any advertising in the news media, and in particular, in minority and women news media.

(d) Whether Contractor has attempted to provide information concerning its EEO policy to Subcontractors with which it does business or had anticipated doing business.

(e) Whether internal procedures exist for, at a minimum, annual dissemination of the EEO policy to employees, specifically to employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions. Such dissemination may occur through distribution of employee policy manuals and handbooks, annual reports, staff meetings and public postings.

(f) Whether Contractor encourages and utilizes minority group members and women

employees to assist in recruiting other employees.

(g) Whether Contractor has apprentice training programs approved by the N.Y.S. Department of Labor which provides for training and hiring of minority group members and women.

(h) Whether the terms of this section have been incorporated into each Subcontract which is entered into by the Contractor.

**5. PARTICIPATION BY MINORITY AND WOMEN-OWNED BUSINESS ENTERPRISES.** Based upon an analysis of the following factors, the University shall determine whether Contractor has made good faith efforts to provide for meaningful participation by minority-owned and women-owned business enterprises which have been certified by DMWBD:

(a) Whether Contractor has actively solicited bids for Subcontracts from qualified M/WBEs, including those firms listed on the Directory of Certified Minority and Women-Owned Business Enterprises, and has documented its good faith efforts towards meeting minority and women owned business enterprise utilization plans by providing, copies of solicitations, copies of any advertisements for participation by certified minority- and women-owned business enterprises timely published in appropriate general circulation, trade and minority- or women-oriented publications, together with the listing(s) and date(s) of the publications of such advertisements; dates of attendance at any pre-bid, pre-award, or other meetings, if any, scheduled by the University, with certified minority- and women-owned business enterprises, and the reasons why any such firm was not selected to participate on the project.

(b) Whether Contractor has attempted to make project plans and specifications available to firms who are not members of associations with

plan rooms and reduce fees for firms who are disadvantaged.

(c) Whether Contractor has utilized the services of organizations which provide technical assistance in connection with M/WBE participation.

(d) Whether Contractor has structured its Subcontracts so that opportunities exist to complete smaller portions of work.

(e) Whether Contractor has encouraged the formation of joint ventures, partnerships, or other similar arrangements among Subcontractors.

(f) Whether Contractor has requested the services of the Department of Economic Development (DED) to assist Subcontractors' efforts to satisfy bonding requirement.

(g) Whether Contractor has made progress payments promptly to its Subcontractors.

(h) Whether the terms of this section have been incorporated into each Subcontract which is entered into by the Contractor. It shall be the responsibility of Contractor to ensure compliance by every Subcontractor with these provisions.

#### **6. MWBE Utilization Plan.**

(a) The Contractor represents and warrants that Contractor has submitted an MWBE Utilization Plan prior to the execution of the contract.

(b) MWBE Utilization Plan (Form 7557-107).

Contractors are required to submit a Utilization Plan on Form 7557-107 with their bid or proposal. Complete the following steps to prepare the Utilization Plan:

- i. list NYS Certified minority- and women-owned business enterprises which the Contractor intends to use to perform the State contract;
- ii. insert a description of the contract scope of work which the Contractor intends to structure to increase the

participation by NYS Certified minority- and women-owned enterprises on the State contract;

- iii. insert the estimated or, if known, actual dollar amounts to be paid to and performance dates of each component of a State contract which the Contractor intends to be performed by a NYS Certified minority- or women-owned business; and

(c) Any modifications or changes to the agreed participation by NYS Certified MWBEs after the Contract Award and during the term of the contract must be reported on a revised MWBE Utilization Plan and submitted to the SUNY University-wide MWBE Program Office.

(d) The University will review the MWBE Utilization Plan and will issue the Contractor a written notice of acceptance or deficiency within twenty (20) day of its receipt. A notice of deficiency shall include the:

- i. list NYS Certified minority- and women-owned business enterprises which the Contractor intends to use to perform the State contract;
- ii. name of any MWBE which is not acceptable for the purpose of complying with the MWBE participation goals;
- iii. reasons why it is not an acceptable element of the Contract scope of work which the MWBE Program Office has determined can be reasonably structured by the Contractor to increase the likelihood of participation in the Contract by MWBEs; and
- iv. other information which the MWBE Program Office determines to be relevant to the MWBE Utilization Plan.



(e) The Contractor shall respond to the notice of deficiency within seven (7) business days of receipt by submitting to the University a written remedy in response to the notice of deficiency.

i. If the written remedy that is submitted is not timely or is found to be inadequate, the University-wide MWBE Program Office shall notify the Contractor and direct the Contractor to submit, within five (5) business days, a request for partial or total waiver of MWBE participation goals on forms provided by the University-wide MWBE Program Office.

ii. Failure to file the waiver form in a timely manner may be grounds for disqualification of the bid or proposal.

(f) The University may disqualify a Contractor as being non-responsive under the following circumstances:

- i. If a Contractor fails to submit a MWBE Utilization Plan;
- ii. If a Contractor fails to submit a written remedy to a notice of deficiency in a MWBE Utilization Plan;
- iii. If a Contractor fails to submit a request for waiver; or
- iv. If the MWBE Program Office determines that the Contractor has failed to document Good Faith Efforts.

(g) Contractor agrees to use such MWBE Utilization Plan for the performance of MWBEs on the Contract pursuant to the prescribed MWBE goals set forth in Section III-A of this Appendix.

(h) Contractor further agrees that a failure to submit and/or use such MWBE Utilization Plan shall constitute a material breach of the terms of the Contract. Upon the

occurrence of such a material breach, SUNY shall be entitled to any remedy provided herein, including but not limited to, a finding of Contractor non-responsiveness.

#### **7. Waivers.**

(a) For Waiver Requests Contractor should use (Form 7557-114) – Waiver Request.

(b) If the Contractor, after making good faith efforts, is unable to comply with MWBE goals, the Contractor may submit a Request for Waiver form documenting good faith efforts by the Contractor to meet such goals. If the documentation included with the waiver request is complete the University shall evaluate the request and issue a written notice of acceptance or denial within twenty (20) days of receipt.

(c) If University, upon review of the MWBE Utilization Plan and updated Quarterly MWBE Contractor Compliance Reports determines that Contractor is failing or refusing to comply with the Contract goals and no waiver has been issued in regards to such non-compliance, the University may issue a notice of deficiency to the Contractor. The contractor must respond to the notice of deficiency within seven (7) business days of receipt. Such response may include a request for partial or total waiver of MWBE Contract Goals.

#### **8. MWBE Contractor Compliance Report.**

Contractor is required to submit an MWBE Contractor Compliance Report (Form 7557-112) to the University by the 5<sup>th</sup> day following each end of quarter over the term of the Contract documenting the progress made towards achievement of the MWBE goals of the Contract. Compliance Reports for construction contracts (Form 7557-110) must be submitted on a monthly basis.

#### **9. GOALS. (a) GOALS FOR MINORITY AND WOMEN WORK FORCE PARTICIPATION.**

(i) The University shall include relevant work force availability data, which is provided by the DMWBD, in all documents which solicit bids for State Contracts and shall make efforts to assist Contractors in utilizing such data to determine expected levels of participation for minority group members and women on State Contracts.

(ii) Contractor shall exert good faith efforts to achieve such goals for minority and women's participation. To successfully achieve such goals, the employment of minority group members and women by Contractor must be substantially uniform during the entire term of this State Contract. In addition, Contractor should not participate in the transfer of employees from one employer or project to another for the sole purpose of achieving goals for minority and women's participation.

#### **(b) GOALS FOR MINORITY AND WOMEN-OWNED BUSINESS ENTERPRISES PARTICIPATION.**

For all State Contracts in excess of \$25,000.00 whereby the University is committed to expend or does expend funds in return for labor, services including but not limited to legal, financial and other professional services, supplies, equipment, materials or an combination of the foregoing or all State Contracts in excess of \$100,000.00 whereby the University is committed to expend or does expend funds for the acquisition, construction, demolition, replacement, major repair or renovation of real property and improvements thereon, Contractor shall exert good faith efforts to achieve a participation goal of fifteen percent (15%) for Certified Minority-Owned Business Enterprises and fifteen percent (15%) for Certified Women-Owned Business Enterprises.

**10. ENFORCEMENT.** The University will be responsible for enforcement of each Contractor's compliance with these provisions. Contractor, and each Subcontractor, shall permit the University access to its books, records and accounts for the purpose of investigating and determining whether Contractor or Subcontractor is in compliance with the requirements of Article 15-A of the Executive Law. If the University determines that a Contractor or Subcontractor may not be in compliance with these provisions, the University may make every reasonable effort to resolve the issue and assist the Contractor or Subcontractor in its efforts to comply with these provisions. If the University is unable to resolve the issue of noncompliance, the University may file a complaint with the DMWBD.

Failure to comply with all of the requirements herein may result in a

finding of non-responsiveness, non-responsibility and/or a breach of contract, leading to the withholding of funds or such other actions, remedies or enforcement proceedings as allowed by the Contract.

**11. DAMAGES FOR NON COMPLIANCE.**

Where the University determines that Contractor is not in compliance with the requirements of the Contract and Contractor refuses to comply with such requirements, or if Contractor is found to have willfully and intentionally failed to comply with the MWBE participation goals, Contractor shall be obligated to pay liquidated damages to the University. Such liquidated damages shall be calculated as an amount equaling the difference between:

a. All sums identified for payment to MWBEs had the Contractor achieved the contractual MWBE goals; and

b. All sums actually paid to MWBEs for work performed or materials supplied under the Contract.

In the event a determination has been made which requires the payment of liquidated damages and such identified sums have not been withheld by the University, Contractor shall pay such liquidated damages to the University within sixty (60) days after such damages are assessed, unless prior to the expiration of such sixtieth day, the Contractor has filed a complaint with the Director of the Division of Minority and Woman Business Development pursuant to Subdivision 8 of Section 313 of the Executive Law in which event the liquidated damages shall be payable if Director renders a decision in favor of the University.

**BID BOND**

BOND NO. \_\_\_\_\_

KNOW ALL PERSONS BY THESE PRESENTS, that \_\_\_\_\_

having an office at  
\_\_\_\_\_(hereinafter called the "Principal") and the  
\_\_\_\_\_(hereinafter called the "Surety") are held and firmly bound unto the State University of New York (hereinafter called the University)  
in the full and just sum of

\_\_\_\_\_ dollars (\$ \_\_\_\_\_)

(in words)

(in figures)

good and lawful money of the United States of America, or in the full and just sum of the difference between the Total Bid of the Principal and the Total Bid of the bidder submitting the next lowest bid, whichever sum shall be higher, for the payment of which said sum of money, well and truly to be made and done, the Principal binds itself, its heirs, executors, administrators, successors and assigns and the Surety binds itself, its successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted to the University a Proposal for Project No. \_\_\_\_\_

Titled \_\_\_\_\_

which Proposal is incorporated herein by reference and made a part hereof as fully and to the same extent as if set forth at length herein;

NOW, THEREFORE, the condition of this obligation is such that in the event (1) the Principal's Total Bid is the lowest one submitted and the Principal timely provides the Post-Bid Information required under Section 8 of the Information for Bidders or (2) the University shall accept the Proposal of the Principal and the Principal shall enter into a Contract with the University in accordance with the terms of such Proposal and/or enter into certain prescribed subcontracts in accordance with the terms of such Proposal and give such Bond or Bonds as may be specified in the Bidding or Contract Documents, then this obligation shall be null and void, otherwise to remain in full force and effect.



## BID BOND

The Surety, for value received, hereby stipulates and agrees that the obligation of said Surety and its Bond shall be in no way impaired or affected by any extension of the time within which the University may accept the Proposal of the Principal and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal has hereunto set its hand and seal and caused this instrument to be signed by its

\_\_\_\_\_ on this

\_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_

\_\_\_\_\_  
Principal

\_\_\_\_\_  
By

IN WITNESS WHEREOF, the Surety has hereunto set its hand and seal and caused this instrument to be signed by its

\_\_\_\_\_ on this

\_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_

\_\_\_\_\_  
Surety

\_\_\_\_\_  
By

## ACKNOWLEDGMENTS FOR BID BOND

### (Acknowledgment by Principal, unless it is a Corporation)

STATE OF NEW YORK           )  
  ) ss.: \_\_\_\_\_  
COUNTY OF                    )

On this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_, before me personally came \_\_\_\_\_  
\_\_\_\_\_, to me known and known to me to be the person(s) described in and who  
executed the foregoing instruments and acknowledged that he / she executed the same.

\_\_\_\_\_  
Notary Public

### (Acknowledgment by Principal, if a Corporation)

STATE OF NEW YORK           )  
  ) ss.: \_\_\_\_\_  
COUNTY OF                    )

On this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_, before me personally came \_\_\_\_\_  
\_\_\_\_\_, to me known, who, being duly sworn, did depose and say  
that he / she resides in \_\_\_\_\_;  
that he / she is the \_\_\_\_\_  
of the \_\_\_\_\_,  
the corporation described in and which executed the foregoing instruments; that he / she knows the seal of said corporation; that the seal  
affixed to said instruments is such corporate seal; that it was so affixed by order of the Board of Directors of said corporation and that he / she  
signed their name thereto by like order.

\_\_\_\_\_  
Notary Public

### (Acknowledgment by Surety Company)

STATE OF                        )  
  ) ss.: \_\_\_\_\_  
COUNTY OF                    )

On this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_, before me personally came \_\_\_\_\_  
\_\_\_\_\_, to me known, who, being by me duly sworn, did depose and say  
that he / she resides in \_\_\_\_\_;  
that he / she is the \_\_\_\_\_  
of the \_\_\_\_\_,  
the corporation described in and which executed the foregoing instruments; that he / she knows the seal of said corporation; that the  
seal affixed to said instruments is such corporate seal; that it was so affixed by the order of the Board of Directors of said corporation, and that  
he / she signed their name thereto by like order; and that the liabilities of said company do not exceed its assets as ascertained in the manner  
provided by the laws of the State of New York.

\_\_\_\_\_  
Notary Public



The State University  
of New York

## PROSPECTIVE BIDDERS NOTICE

### MINORITY AND WOMEN-OWNED BUSINESS ENTERPRISE REQUIREMENTS: CONSTRUCTION CONTRACTS

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To Prospective Bidders:

Consistent with the State University of New York (SUNY)'s commitment and in accordance with Article 15-A of the New York State Executive Law, contractors are required to ensure that good faith efforts are made to include meaningful participation by Minority and Women-Owned Business Enterprises (MWBE). These requirements apply to all SUNY construction contracts in excess of \$100,000.

**Receipt of the MWBE utilization plan is required within seven (7) business days after the bid opening for construction contracts only.** The Contract Administrator shall provide MWBE Utilization Plan Form (107) to the campus MWBE Program Coordinator for review and approval for the three apparent low bidders ("Contractor"). The MWBE forms identified below shall be submitted by all bidders.

- a. MWBE Utilization Plan (7557-107)
- b. MWBE-EEO Staffing Plan (7557-108)
- c. MWBE-EEO Policy (7557-104) or the vendor/contractor's own EEO Policy Statement

If the Contractor's MWBE participation rate shown on its MWBE Utilization Plan is below 30%, the campus MWBE Program Coordinator will provide a written notice of deficiency of the Utilization Plan within twenty (20) business days of its submission to the contractor, as required under 5 NYCRR §142.4.

The notice will include, but not be limited to the following:

- a. A list of NYS certified MWBEs that the contractor could potentially use within the contract scope of work;
- b. The name of any MWBE which is not acceptable for the purpose of complying with the MWBE participation goals; and
- c. Any other information which the MWBE Program Coordinator determines to be relevant to develop an approvable MWBE Utilization Plan.

The contractor shall respond to the notice of deficiency by submitting a revised MWBE Utilization Plan within seven (7) business days, as required by 5 NYCRR Part §142.6 (e) to the MWBE Program Coordinator.

If the deficiency is not corrected and the MWBE participation rate on the MWBE Utilization Plan is still below 30%, the contractor should request a waiver.

The Waiver Request Form submitted by the Contractor will include, but not be limited to, the following:

- a. A request for partial or total waiver of MWBE goals as required by 5 NYCRR Part §142.6 (f) on Request for Waiver Form (Form 7557-114) provided by the University-wide MWBE Program Office.
- b. Copy of the deficient Utilization Plan.
- c. Work Scope of this contract. If there are subcontracting opportunities, please provide documentation d, e, and f.
- d. Screenshot of searching results for available MWBEs in NYS M/WBE Directory.
- e. Copy of email messages containing the request for quote, along with the responses from MWBEs.
- f. Forms required to obtain this information are:  
7557-101 – MWBE Contractor Solicitation Letter  
7557-102 – MWBE Participation Quote

7557-103 – MWBE Contractor Unavailability Certification

Please submit the above documentations by mail, fax, or email:

[CAMPUS

NAME]

[CAMPUS MWBE PROGRAM COORDINATOR]

[CAMPUS ADDRESS]

Fax: [CAMPUS FAX]

Tel: [CAMPUS PHONE]

Email: [CAMPUS CONTACT]

- OR - IF APPLICABLE

Please submit the above documentation to the University-wide MWBE Program Office:

SUNY System Administration at State University

Plaza,

Office of Diversity, Equity and Inclusion

University-wide MWBE Program

Albany, NY 12246

Fax: (518)-320-1548

Tel: (518)-320-1452

Email: MWBEProgram@suny.edu

Information regarding this legislation may be found at: Participation by Minority Group Members and Women (MWBEs) with Respect to State University of New York Contracts on the State University of New York web site.

## STATE UNIVERSITY OF NEW YORK MWBE UTILIZATION PLAN INSTRUCTIONS (FOR ALL CONTRACT TYPES)

A letter of explanation and documentation of efforts should accompany any MBE/WBE Utilization Plan that falls short of the stated goals. Without an approved MBE/WBE Utilization Plan, SUNY's Notice of Award and Contract may be withheld.

If you have questions or need assistance related to the SUNY's Minority and Women's Business requirements call the University-wide MWBE Program Office at 518-320-1189 or email [MWBEprogram@suny.edu](mailto:MWBEprogram@suny.edu).

1. The three low bidding contractors ("Contractors") are required to submit a Utilization Plan (107) to the MWBE Program Coordinator within seven (7) calendar days after the opening of bids for construction contracts exceeding \$100,000.
2. The MWBE Program Coordinator is required to submit the mandatory MWBE documentation to the University-wide MWBE Program Office web based contract management system for commodity, service and construction related consultant service contracts exceeding \$25,000 for construction project exceeding \$100,000 upon contract execution.
3. The MBE and WBE goals are separate and not to be treated as one combined goal.
4. The MBE and WBE firms included are businesses the bidder *seriously expects* to include in the project activity.
5. The contractor reasonably commits to the dollar values included in the plan for participation by MBE and WBE subcontractors and suppliers.
6. MBE and WBE firms **must be certified** by the New York State Department of Economic Development, Division of Minority and Women Business Development. A directory of certified minority and women-owned business enterprises is available on the internet at <https://ny.newnycontracts.com/FrontEnd/VendorSearchPublic.asp>.
7. Contractors utilizing MWBE firms for supplies/materials/equipment whose NYS certification profile designates them as Broker will receive an MWBE utilization credit for the actual monetary value of the broker fees or the actual markup percentage of the items brokered.
8. MBE and WBE Participation:

The actual services provided by the MBE or WBE must be essential in the performance of the scope of work for the applicable contract. Utilization of a certified MBE or WBE as a conduit or pass through for participation credit is **strictly prohibited**. It is the discretion of University-wide MWBE Program to determine whether services are essential in the performance of the scope of work and offer a determination of the appropriateness of work allowed for lower tier subcontracting in accordance with practices generally accepted in the construction industry. The services the MBE or WBE will provide must be among those explicitly identified in the profile (codes) of firm as listed in the NYS Empire State Development Directory of Certified MWBEs. Firms submitted or who participate in the project outside of these conditions and without specific prior approval by SUNY will not be credited toward the MWBE Utilization Plan and goals for the contract.

9. Prior to submitting the Plan, the bidders should confirm the following:
  - a. MBE and WBE firms are NYS certified;
  - b. MBE **or** WBE designation ~ Dual certified firms may be used as *either* but **not** both;
  - c. MBE and WBE firms are being used for item(s) within their certification product codes;
  - d. MBE and WBE firms will perform work for which they have been submitted; and
  - e. 2nd tier subcontractors and/or suppliers are noted as such and the purchaser of the product identified (i.e. purchase by electrical sub)

The prime Contractor is responsible for ensuring participation provided by subcontractors for 2nd and 3rd tier MBE and WBE participation.

Submission of a Utilization Plan which fails to meet or exceed each goal shall be accompanied by documentation of specific efforts undertaken both pre and post bid. The campus MWBE Program Coordinator will review and notify Contractor of its assessment.

The University-wide MWBE Program Office in collaboration with the campus MWBE Program Coordinator will review the Utilization Plan and notify the contractor of any deficiencies and determine necessary actions to bring the Utilization Plan into compliance. The University-wide MWBE Program Office reserves the right to require the contractor to provide sufficient documentation of the efforts made in the development of the Plan. The documentation should meet the good faith efforts standard under 5 NYCRR Part §141.6, and demonstrate the contractor's commitment to providing opportunities for MBE and WBE firms in the development of the plan.

A copy of the approved Utilization Plan will be provided to the contractor after issuance of Notice of Award.

### **MWBE FORM (107) INSTRUCTIONS**

Requested information must be completed and submitted within seven (7) days after the bid opening.

**Subcontractor Name & Address**

Name & Address of each MBE/WBE subcontractor or supplier

**MBE or WBE**

Minority (MBE) or Women (WBE) Designation

**Federal ID**

Provide accurate Federal ID number of each MBE/WBE subcontractor or supplier

**Dollar Value of Subcontract or Purchase Order**

This is the total value of the signed subcontract. If this value is different from the amount in the approved MBE/WBE utilization plan, an explanation should be provided.

**Description of Work or Supplies**

Brief description of work performed or supplies provided by the MBE/WBE subcontractor or supplier

**Schedule**

This is the anticipated start and completion dates for each MBE/WBE subcontractor or supplier.  
Do not include the construction schedule for the life of the entire project.

**Signature**

To be signed by an Officer of the Company

- The information included on the form is subject to verification by the campus MWBE Program Coordinator.
- The campus MWBE Program Coordinator must be notified prior to changes made to the approved MBE/WBE Utilization Plan.

Questions regarding this form should **first** be directed to the campus MWBE Program Coordinator (click the link and be directed to the SUNY MWBE Campus Contacts directory on the University-wide MWBE web site).

Questions regarding this form should be directed to the University-wide MWBE Program Office at (518) 320-1189 or via e-mail: MWBEprogram@suny.edu.

***Submit To:***

State University of New York  
Office of Diversity, Equity and Inclusion University-wide MWBE Program  
353 Broadway  
Albany, NY 12246  
Or MWBEProgram@suny.edu





## UNIVERSITY-WIDE MWBE PROGRAM UTILIZATION PLAN

SUNY Project No. \_\_\_\_\_  
Contractor: \_\_\_\_\_  
Address: \_\_\_\_\_  
Phone Number: \_\_\_\_\_

Bid Date: [Click here to enter a date.](#) Agreement/Contract Value: \_\_\_\_\_  
Primary Contact: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_  
Fax Number: \_\_\_\_\_ E-Mail: \_\_\_\_\_

GOALS: MBE \_\_\_\_\_%

WBE \_\_\_\_\_%

Campus: \_\_\_\_\_

SUBCONTRACTOR	FEDERAL ID #	DOLLAR VALUE OF CONTRACT OR PURCHASE ORDER	DESCRIPTION OF WORK OR SUPPLIES	SUBCONTRACTOR/SUPPLIER SCHEDULE	
				START DATE	COMPLETION DATE
Company Name: _____ Street Address: _____ Contact Name: _____ E-Mail Address: _____ Check One: MBE <input type="checkbox"/> WBE <input type="checkbox"/>				<a href="#">Click here to enter a date.</a>	<a href="#">Click here to enter a date.</a>
Company Name: _____ Street Address: _____ Contact Name: _____ E-Mail Address: _____ Check One: MBE <input type="checkbox"/> WBE <input type="checkbox"/>				<a href="#">Click here to enter a date.</a>	<a href="#">Click here to enter a date.</a>
Company Name: _____ Street Address: _____ Contact Name: _____ E-Mail Address: _____ Check One: MBE <input type="checkbox"/> WBE <input type="checkbox"/>				<a href="#">Click here to enter a date.</a>	<a href="#">Click here to enter a date.</a>
Company Name: _____ Street Address: _____ Contact Name: _____ E-Mail Address: _____ Check One: MBE <input type="checkbox"/> WBE <input type="checkbox"/>				<a href="#">Click here to enter a date.</a>	<a href="#">Click here to enter a date.</a>

In accordance with the SUNY Contract Documents and Executive Law Article 15-A, my firm seriously expects to use the NYS certified MBE/WBE certified firms listed above. The Contractor shall immediately notify and request approval prior to any changes to this plan from the University-wide MWBE Program Office. ☐

NAME: \_\_\_\_\_ TITLE: \_\_\_\_\_ COMPANY OFFICER'S SIGNATURE \_\_\_\_\_ DATE: \_\_\_\_\_  
[Click here to enter a date.](#)

APPROVED: ☐ DEFICIENT: ☐ MWBE PROGRAM COORDINATOR: \_\_\_\_\_ DATE: \_\_\_\_\_



**MINORITY AND WOMEN'S BUSINESS - EQUAL EMPLOYMENT  
OPPORTUNITY PROGRAM POLICY STATEMENT**

**Policy Statement**

The \_\_\_\_\_ commits to carrying out the intent of the New York State  
(Name of Campus, Consultant, Contractor)  
Executive Law, Article 15-A which assures the meaningful participation of minority and  
women's business enterprises in contracting and the meaningful participation of minorities and  
women in the workforce on activities financed by public funds.

**Minority Business Officer**

\_\_\_\_\_ is designated as the Minority Business Enterprise Officer  
(Name of Designated Officer)  
responsible for administering the Minority and Women's Business-Equal Employment  
Opportunity (M/WBE-EEO) program.

Phone \_\_\_\_\_

Email \_\_\_\_\_

**M/WBE Contract Goals**

\_\_\_\_\_ % Minority Business Enterprise Participation

\_\_\_\_\_ % Women's Business Enterprise Participation

**EEO Contract Goals**

10% Minority Labor Force Participation

10% Female Labor Force Participation

\_\_\_\_\_  
(Authorized Representative)

Title: \_\_\_\_\_

Date: \_\_\_\_\_

**EEO STAFFING PLAN**

Instructions on page 2

<b>Solicitation No.:</b>	<b>Reporting Entity:</b>	<b>Report includes Contractor's/Subcontractor's:</b> <input type="checkbox"/> Work force to be utilized on this contract <input type="checkbox"/> Total work force
<b>Offeror's Name:</b>		<input type="checkbox"/> Offerer <input type="checkbox"/> Subcontractor <b>Subcontractor's name</b> _____
<b>Offeror's Address:</b>		

Enter the total number of employees for each classification in each of the EEO-Job Categories identified

EEO-Job Category	Total Work force	Work force by Gender		Work force by Race/Ethnic Identification													
		Total Male (M)	Total Female (F)	White (M) (F)		Black (M) (F)		Hispanic (M) (F)		Asian (M) (F)		Native American (M) (F)		Disabled (M) (F)		Veteran (M) (F)	
Officials/Administrators																	
Professionals																	
Technicians																	
Sales Workers																	
Office/Clerical																	
Craft Workers																	
Laborers																	
Service Workers																	
Temporary /Apprentices																	
Totals																	

<b>PREPARED BY (Signature):</b>	<b>TELEPHONE NO.:</b> <b>EMAIL ADDRESS:</b>	<b>DATE:</b>
<b>NAME AND TITLE OF PREPARER (Print or Type):</b>	<b>Submit completed with bid or proposal</b>	

**General instructions:** All Offerors and each subcontractor identified in the bid or proposal must complete an EEO Staffing Plan (ADM/EEO 100) and submit it as part of the bid or proposal package. For construction, except for contracts of \$100,000 or less, the three lowest bidders shall submit to the University for its approval an EEO Staffing Plan within seven (7) calendar days after the opening of bids. Where the work force to be utilized in the performance of the State contract can be separated out from the contractor's and/or subcontractor's total work force, the Offeror shall complete this form only for the anticipated work force to be utilized on the State contract. Where the work force to be utilized in the performance of the State contract cannot be separated out from the contractor's and/or subcontractor's total work force, the Offeror shall complete this form for the contractor's and/or subcontractor's total work force.

**Instructions for completing:**

1. Enter the Solicitation number that this report applies to along with the name and address of the Offeror.
2. Check off the appropriate box to indicate if the Offeror completing the report is the contractor or a subcontractor.
3. Check off the appropriate box to indicate work force to be utilized on the contract or the Offerors' total work force.
4. Enter the total work force by EEO job category.
5. Break down the anticipated total work force by gender and enter under the heading 'Work force by Gender'
6. Break down the anticipated total work force by race/ethnic identification and enter under the heading 'Work force by Race/Ethnic Identification'. Contact the M/WBE Permissible contact(s) for the solicitation if you have any questions.
7. Enter information on disabled or veterans included in the anticipated work force under the appropriate headings.
8. Enter the name, title, phone number and email address for the person completing the form. Sign and date the form in the designated boxes.

**RACE/ETHNIC IDENTIFICATION**

Race/ethnic designations as used by the Equal Employment Opportunity Commission do not denote scientific definitions of anthropological origins. For the purposes of this form, an employee may be included in the group to which he or she appears to belong, identifies with, or is regarded in the community as belonging. However, no person should be counted in more than one race/ethnic group. The race/ethnic categories for this survey are:

- **WHITE** (Not of Hispanic origin) All persons having origins in any of the original peoples of Europe, North Africa, or the Middle East.
- **BLACK** a person, not of Hispanic origin, who has origins in any of the black racial groups of the original peoples of Africa.
- **HISPANIC** a person of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish culture or origin, regardless of race.
- **ASIAN & PACIFIC ISLANDER** a person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent or the Pacific Islands.
- **NATIVE INDIAN (NATIVE AMERICAN/ ALASKAN NATIVE)** a person having origins in any of the original peoples of North America, and who maintains cultural identification through tribal affiliation or community recognition.

**OTHER CATEGORIES**

- **DISABLED INDIVIDUAL** any person who:
  - has a physical or mental impairment that substantially limits one or more major life activity(ies)
  - has a record of such an impairment; or
  - is regarded as having such an impairment.
- **VIETNAM ERA VETERAN** a veteran who served at any time between and including January 1, 1963 and May 7, 1975.
- **GENDER** Male or Female



The State University  
of New York

**PROSPECTIVE BIDDERS NOTICE**  
**SERVICE DISABLED VETERAN-OWNED BUSINESS ENTERPRISE REQUIREMENTS:**  
**CONSTRUCTION CONTRACTS**

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To Prospective Bidders:

Consistent with the State University of New York (SUNY) 's commitment and in accordance with Article 17-B of the New York State Executive Law and its implementing regulations, state agencies and contractors are required to ensure that good faith efforts are made to include meaningful participation by Service Disabled Veteran-Owned Business (SDVOB). The requirements apply to all SUNY construction contracts in excess of \$100,000.

**Receipt of the SDVOB Utilization Plan is required within seven (7) business days after the bid opening, for construction contracts.** The SDVOB Utilization Plan Form No. 7654-107 shall be submitted by the three apparent low bidders ("Contractor") to the campus MWBE Program Coordinator.

If the Contractor's SDVOB participation rate shown on its SDVOB Utilization Plan is below 6%, the campus MWBE Program Coordinator will provide a written notice of deficiency of the Utilization Plan within twenty (20) business days of its submission to the Contractor, as required under 9 NYCRR § 252.2(l)(4).

The notice will include but not be limited to the following:

- a. A list of NYS certified SDVOBs that the Contractor could potentially use within the contract scope of work;
- b. The name of any SDVOB that is not acceptable for the purpose of complying with the SDVOB participation goals; and
- c. Any other information which the MWBE Program Coordinator determines to be relevant to developing an approvable Utilization Plan.

The Contractor shall respond to the notice of deficiency by submitting a revised SDVOB Utilization Plan within seven (7) business days, as required by 9 NYCRR § 252.2(l) (5) to the MWBE Program Coordinator.

If the deficiency is not corrected and the SDVOB participation rate on the SDVOB Utilization Plan remains below 6%, the Contractor should request a waiver.

The Waiver Request Form submitted by the Contractor will include but not limited to the following:

- a. A request for partial or total waiver of SDVOB goals are required by (9 NYCRR § 252.2(m) (2) on Request for Waiver Form (Form 7564-114) provided by the University-wide MWBE Program Office.
- b. Copy of the deficient Utilization Plan.
- c. Work Scope of this contract. If there are subcontracting opportunities, please provide documentation d, e, and f.
- d. Screenshot of searching result for available SDVOBs in Directory of NYS Certified SDVOBs.
- e. Copy of email messages containing the request for quote along with the responses from MWBEs.
- f. Forms required to obtain this information are:  
7564-101 – SDVOB Contractor Solicitation Letter  
7564-102 – SDVOB Participation Quote  
7564-103 – SDVOB Contractor Unavailability Certification

Please submit the above documentations by mail, fax, or email:

Please submit the above documentation to the campus MWBE Program Coordinator:

[CAMPUS  
NAME]

[CAMPUS MWBE PROGRAM COORDINATOR]

[CAMPUS ADDRESS]

Fax: [CAMPUS FAX]

Tel: [CAMPUS PHONE]

Email: [CAMPUS CONTACT]

- OR - IF APPLICABLE

SUNY System Administration at State University  
Plaza,  
Office of Diversity, Equity and Inclusion  
University-wide MWBE Program  
Albany, NY 12246  
Fax: (518)-320-1548  
Tel: (518)-320-1452  
Email: MWBEProgram@suny.edu

Information regarding this legislation may be found at: Division of Service-Disabled Veterans' Business Development on the New York State Office General Services web site.

## STATE UNIVERSITY OF NEW YORK SDVOB UTILIZATION PLAN

A letter of explanation and documentation of efforts must accompany any SDVOB Utilization Plan that falls short of the stated goals. Without an approved SDVOB Utilization Plan, SUNY's Notice of Award and Contract may be withheld.

If you have questions or need assistance related to the SUNY's Service-Disabled Veteran-Owned Business requirements call the University-wide MWBE Program Office at 518-320-1452 or email [MWBEprogram@suny.edu](mailto:MWBEprogram@suny.edu).

1. The three low bidding contractors ("Contractors") are required to submit a Utilization Plan (Form 7564-107) to the MWBE Program Coordinator within seven (7) calendar days after the opening of bids for construction contracts exceeding \$100,000.
2. The MWBE Program Coordinator is required to submit the mandatory SDVOB documentation to the University-wide MWBE Program Office web based contract management system for commodity, service and construction related consultant service contracts exceeding \$25,000 and for construction project exceeding \$100,000 upon contract execution .
3. The SDVOB firms included are businesses the Contractor *seriously expects* to include in the project activity.
4. The Contractor must reasonably commit to the dollar values included in the Utilization Plan for participation by SDVOB subcontractors and suppliers.
5. SDVOB firms **must be certified** by the Division of Service-Disabled Veterans' Business Development. A directory of certified minority and women-owned business enterprises is available on the internet at [http://ogs.ny.gov/Core/Docs/CertifiedNYS\\_SDVOB.pdf](http://ogs.ny.gov/Core/Docs/CertifiedNYS_SDVOB.pdf). If you would like to receive an excel file containing the current the List of NYS Certified Service-Disabled Veteran-Owned Businesses and sign up to receive updates whenever we certify new businesses, please send a request to [veteransdevelopment@ogs.ny.gov](mailto:veteransdevelopment@ogs.ny.gov).
6. Contractors utilizing SDVOB firms for supplies/materials/equipment whose NYS certification profile designates them as Broker will receive an SDVOB utilization credit for the actual monetary value of the broker fees or the actual markup percentage of the items brokered.

### 7. SDVOB Participation:

The actual services provided by the SDVOB must be essential in the performance of the scope of work for the applicable contract. Utilization of a certified SDVOB as a conduit or pass through for participation credit is strictly prohibited. It is the discretion of SUNY University-wide MWBE Program to determine whether services are essential in the performance of the scope of work and to offer a determination of the appropriateness of work allowed for lower tier subcontracting, in accordance with practices generally accepted in the construction industry. The services the SDVOB will provide must be among those explicitly identified in the profile (codes) of the firm as listed in the SDVOB directory Division of Service-Disabled Veterans' Business Development. Firms submitted or firms that participate in the project outside of these conditions and without specific prior approval by SUNY will not be credited toward the SDVOB Utilization Plan and goals for the contract.

### 8. Prior to submitting the Utilization Plan, the bidders should confirm the following:

- a. SDVOB firms are NYS certified;
- b. SDVOB firms are being used for item(s) within their certification product codes as indicated in their SDVOB Directory firm profile;
- c. SDVOB firms will perform work for which they have been submitted; and
- d. 2nd tier subcontractors and/or suppliers are identified as such and SDVOB Utilization credit shall be given for 60% of the total contract value of supply purchases or services rendered (for example, when an electrical subcontractor purchases from a 3rd party supplier an SDVOB utilization credit will be given for 60% of the total contract value).

The prime Contractor is responsible for ensuring participation provided by subcontractors for 2nd and 3rd tier SDVOB participation.

Submission of a Utilization Plan which fails to meet or exceed each goal shall be accompanied by documentation of specific efforts undertaken both pre- and post-bid. The campus MWBE Program Coordinator will review and notify Contractor of its assessment.

The University-wide MWBE Program Office in collaboration with the campus MWBE Program Coordinator will review the Utilization Plan and notify the Contractor of any deficiencies and determine necessary actions to bring the Plan into compliance. The University-wide MWBE Program Office reserves the right to require the Contractor to provide sufficient documentation of the efforts made in the development of the Utilization Plan. The documentation should meet the good faith efforts standard under 9 NYCRR § 252.2, and demonstrate the Contractor's commitment to providing opportunities for SDVOB firms in the development of the Utilization Plan.

A copy of the approved Utilization Plan will be provided to the Contractor after issuance of Notice of Award.

#### **SDVOB FORM (7564-107) UTILIZATION PLAN INSTRUCTIONS**

Requested information must be completed and submitted within seven (7) days after the bid opening.

##### **Subcontractor Name & Address**

Name & Address of each SDVOB subcontractor or supplier.

##### **Federal ID**

Provide accurate Federal ID number of each SDVOB subcontractor or supplier.

##### **Dollar Value of Subcontract or Purchase Order**

This is the total value of the signed subcontract. If this value is different from the amount in the approved SDVOB Utilization Plan, an explanation should be provided.

##### **Description of Work or Supplies**

Brief description of work performed or supplies provided by the SDVOB subcontractor or supplier.

##### **Schedule**

This is the anticipated start and completion dates for each SDVOB subcontractor or supplier. Do not include the construction schedule for the life of the entire project.

##### **Signature**

To be signed by an Officer of the Company.

- The information included on the Form 7564-107 is subject to verification by the campus MWBE Program Coordinator.
- The campus MWBE Program Coordinator must be notified prior to changes made to the approved SDVOB Utilization Plan.

Questions regarding this form should **first** be directed to the campus MWBE Program Coordinator (click the link and be directed to the SUNY MWBE Campus Contacts directory on the University-wide MWBE web site).

Questions regarding this form should be directed to the University-wide MWBE Program Office at (518) 320- 1340 or via e-mail: MWBEprogram@suny.edu.

##### ***Submit To:***

State University of New York  
Office of Diversity, Equity and Inclusion University-wide MWBE Program  
353 Broadway  
Albany, NY 12246  
Or MWBEProgram@suny.edu



### UNIVERSITY-WIDE SDVOB PROGRAM UTILIZATION PLAN

SUNY Project No. \_\_\_\_\_  
Contractor: \_\_\_\_\_  
Address: \_\_\_\_\_  
Phone Number: \_\_\_\_\_

Bid Date: [Click here to enter a date.](#)

Agreement/Contract Value: \_\_\_\_\_

Primary Contact: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Fax Number: \_\_\_\_\_ E-Mail: \_\_\_\_\_

GOALS: SDVOB \_\_\_\_\_%

Campus: \_\_\_\_\_

SUBCONTRACTOR	FEDERAL ID #	DOLLAR VALUE OF CONTRACT OR PURCHASE ORDER	DESCRIPTION OF WORK OR SUPPLIES	SUBCONTRACTOR/SUPPLIER SCHEDULE	
				START DATE	COMPLETION DATE
Company Name: _____ Street Address: _____ Contact Name: _____ E-Mail Address: _____				<a href="#">Click here to enter a date.</a>	<a href="#">Click here to enter a date.</a>
Company Name: _____ Street Address: _____ Contact Name: _____ E-Mail Address: _____				<a href="#">Click here to enter a date.</a>	<a href="#">Click here to enter a date.</a>
Company Name: _____ Street Address: _____ Contact Name: _____ E-Mail Address: _____				<a href="#">Click here to enter a date.</a>	<a href="#">Click here to enter a date.</a>
Company Name: _____ Street Address: _____ Contact Name: _____ E-Mail Address: _____				<a href="#">Click here to enter a date.</a>	<a href="#">Click here to enter a date.</a>

In accordance with the SUNY Contract Documents and Executive Law Article 17-B, my firm seriously expects to use the NYS certified SDVOB firms listed above. The Contractor shall immediately notify and request approval prior to any changes to this Utilization Plan from the Campus MWBE Program Coordinator.



NAME: \_\_\_\_\_ TITLE: \_\_\_\_\_ COMPANY OFFICER'S SIGNATURE \_\_\_\_\_ DATE: \_\_\_\_\_  
[Click here to enter a date.](#)

APPROVED: ☐ DEFICIENT: ☐ MWBE PROGRAM COORDINATOR: \_\_\_\_\_ DATE: \_\_\_\_\_





## UNIVERSITY-WIDE SDVOB PROGRAM UTILIZATION PLAN SDVOB FORM (107) INSTRUCTIONS

A letter of explanation and documentation of efforts must accompany any SDVOB Utilization Plan that falls short of the stated goals. Without an approved SDVOB Utilization Plan, SUNY's Notice of Award and Contract may be withheld.

If you have questions or need assistance related to the SUNY's Service-Disabled Veteran-Owned Business requirements call the University-wide MWBE Program Office at 518-320-1340 or email [MWBEprogram@suny.edu](mailto:MWBEprogram@suny.edu).

1. The three low bidding contractors ("Contractors") are required to submit an SDVOB Utilization Plan (Form 7465-107) to the MWBE Program Coordinator within seven (7) calendar days after the opening of bids for construction contracts exceeding \$100,000.
2. The MWBE Program Coordinator is required to submit the mandatory SDVOB documentation to the University-wide MWBE Program Office after the opening of bids for commodity, service and construction related consultant service contracts exceeding \$25,000 for the lowest bidding Contractor.
3. The SDVOB goals are not related to any other goals. Dual certified firms may be used to meet both MBE and SDVOB or WBE and SDVOB goals.
4. The SDVOB firms included are businesses the bidder *seriously expects* to include in the project activity.
5. The Contractor must reasonably commit to the values included in the Utilization Plan for participation by SDVOB subcontractors and suppliers.
6. SDVOB firms must be certified by the New York State Office of General Services Division of Service-Disabled Veterans' Business Development. A directory of NYS Certified Service-Disabled Veteran-Owned Businesses is available on the internet at <http://ogs.ny.gov/Core/SDVOBA.asp>.
7. Contractors utilizing SDVOB firms for supplies/materials/equipment whose NYS certification profile designates them as a Broker will receive an SDVOB utilization credit for the actual monetary value of the broker fees or the actual markup percentage of the items brokered.
8. SDVOB Participation:

The actual services provided by the SDVOB must be essential in the performance of the scope of work for the applicable contract. Utilization of a certified SDVOB as a conduit or pass through for participation credit is strictly prohibited. It is the discretion of the SUNY to determine whether services are essential in the performance of the scope of work and to offer a determination of the appropriateness of work allowed for lower tier subcontracting, in accordance with practices generally accepted in the construction industry. The services the SDVOB will provide must be among those explicitly identified in the profile (codes) of the firm as listed in the NYS Office of General Services Directory of Certified SDVOBs. Firms submitted or firms that participate in the project outside of these conditions and without specific prior approval by SUNY will not be credited toward the SDVOB Utilization Plan and goals for the contract. ☐

9. Prior to submitting the Utilization Plan, the bidders should confirm the following:
  - a. SDVOB firms are NYS certified;
  - b. SDVOB designation ~ Dual certified firms may be used as *MBE/SDVOB and/or WBE/SDVOB*;
  - c. SDVOB firms are being used for item(s) within their certification product codes as indicated in their SDVOB Directory firm profile;
  - d. SDVOB firms will perform work for which they have been submitted; and
  - e. 2nd tier subcontractors and/or suppliers are identified as such and SDVOB Utilization credit shall be given for 60% of the total contract value of supply purchases or services rendered (for example, when an electrical subcontractor purchases from a 3rd party supplier an SDVOB utilization credit will be given for 60% credit of the total contract value).



## UNIVERSITY-WIDE SDVOB PROGRAM UTILIZATION PLAN

The prime Contractor is responsible for ensuring participation provided by subcontractors for 2nd and 3rd tier SDVOB participation.

Submission of a Utilization Plan which fails to meet or exceed each goal shall be accompanied by documentation of specific efforts undertaken both pre and post bid. The campus MWBE Program Coordinator will review and notify Contractor of its assessment.

The University-wide MWBE Program Office in collaboration with the campus MWBE Program Coordinator will review the Utilization Plan and notify the Contractor of any deficiencies and determine necessary actions to bring the Utilization Plan into compliance. The University-wide MWBE Program Office reserves the right to require the Contractor to provide sufficient documentation of the efforts made in the development of the Utilization Plan. The documentation should be responsive to good faith efforts and demonstrate the Contractor's commitment to providing opportunities for SDVOB firms in the development of the Utilization Plan.

A copy of the approved Utilization Plan will be provided to the Contractor after issuance of Notice of Award.

