

**District of Columbia Courts**  
**Capital Projects & Facilities Management Division**  
616 H Street, NW, Sixth Floor, Suite 622  
Washington, DC 20001

**H. Carl Moultrie I Courthouse**  
**500 Indiana Avenue NW**  
**Washington DC, 20001**

**Interior Improvements for:**  
**4<sup>th</sup> Floor Swing Spaces – Interim Juvenile Intake**  
**and Mental Health**

## **PROJECT MANUAL**

CONSTRUCTION DOCUMENTS

PERMIT AND BID SET

NOVEMBER 8TH, 2017

Architect:  
**IBI Group of Virginia Inc**  
**Architects, Planners & Interior Designers**  
1505 Prince Street, Alexandria, VA 22314  
Tel.: 703-836-9600



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## SECTION 01 1000 - SUMMARY

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes:

- 1. Project information.
- 2. Work covered by Contract Documents.
- 3. Phased construction.
- 4. Working hours.
- 5. Work under separate contracts.
- 6. Interface with existing building systems.
- 7. Access to site.
- 8. Work restrictions.
- 9. Miscellaneous provisions.
  - a. Security.
  - b. General Security Regulations.

- 10. Attachment Forms.

- B. Related Requirements:

- 1. Section 01 5000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

#### 1.3 PROJECT INFORMATION

- A. Project Identification and Location: Refer to drawings.

- B. Owner: District of Columbia Courts  
Capital Projects & Facilities Management Division  
616 H Street, NW, Sixth Floor, Suite 622  
Washington, DC 20001

- C. Architect: IBI Group of Virginia, Inc., 1505 Prince Street, Alexandria, VA 22314, USA.

- D. Construction Manager: Markon Solution., 400 South Maple Ave., Suite 230, Falls Church, VA 22046.

- 1. A construction Manager has been engaged for this Project to serve as an advisor to Owner and to provide assistance in administering the Contract for Construction between Owner and each Contractor, according to a separate contract between Owner and Construction Manager.

- E. Project Web Site: (not applicable)

#### 1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of the Project is defined by the Contract Documents refer to Drawings - "General Description of Work".
- B. Type of Contract
  - 1. Project will be constructed under a single prime contract.

#### 1.5 PHASED CONSTRUCTION

- A. General: The phasing of work shall be coordinated with the DCC and the Sequencing Plans provided in the Construction Documents Package.

#### 1.6 WORKING HOURS

- A. On-Site Work Hours: Limit work in the existing H. Carl Moultrie I Courthouse, 500 Indiana Ave NW, Washington DC, 20001 to the hours of 6 PM to 6 AM, Monday through Friday, except as otherwise indicated.
  - 1. Weekend Hours (Saturday): Typically 6 AM to 3 PM.
  - 2. Sundays or Legal Holidays: No work shall be done at any time on Sundays or legal holidays except with the written permission of the Contracting Officer and the DCSC.
  - 3. Weekend and Weekday Overtime Work Hours: Contractor must advise prior to need for overtime hours and coordinate with security. Security is also needed for entrance into any secure area.
  - 4. Hours for Utility Shutdowns: Refer to requirements of Article "Work Restrictions" in this Section.
  - 5. Hours for Core Drilling and Noisy Activity: Typically after 7 PM and halt before 6 AM during the weekdays and weekends.

#### 1.7 WORK UNDER SEPARATE CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.
  - 1. The Owner will contract separately for the Tenant furniture, low voltage cabling, and security infrastructure.
  - 2. The Contractor will be responsible for providing rough-in locations for the above items per coordinated shop drawings.

#### 1.8 INTERFACE WITH EXISTING BUILDING SYSTEMS

- A. Security - Security System Design and Devices to be provided by Owner's Vendor – Tyco, coordination by General Contractor.
- B. Fire Protection - Fire Protection Systems Design only is provided by Owner's Vendor – Posey Associates and coordinated by General Contractor. General Contractor or his sprinkler system sub-contractor shall provide fire protection system including fire protection devices. Contractor shall submit final shop drawing for review and permit.



- C. Fire Alarm: Fire alarm work shall be performed by qualified personnel trained and certified by the manufacturer of the existing system for installation of the required units, components, accessories, wiring and programming as required for the project. Personnel performing the work shall be under the supervision of a qualified NICET Certified Professional. All fire alarm work shall be coordinated with the base building fire alarm system contractor responsible for the system maintenance.

#### 1.9 ACCESS TO SITE

- A. General: Contractor shall have limited use of Project site within the Contract limits indicated for construction operations as shown on Drawings and as specified by requirements of this Section. In addition Contractor's use of project site is limited only by Owner's right to perform work or to retain other contractors on portions of this project.
  - 1. Do not disturb portions of the site beyond areas in which the Work is indicated and allow for Owner occupancy and public use of adjacent spaces.
- B. Entrances: Keep entrances serving premises clear and available at all times to the Owner, Owner employees, visitors and emergency vehicles. Do not use this area for storage of materials.
  - 1. Schedule deliveries to minimize use of entrances by construction operations.
  - 2. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Take precautions to protect the building, its occupants and the public during the construction period.
  - 1. Repair damage caused by construction operations.
- D. Parking: No parking will be available on site. The Contractor and Contractor's employees shall make their own arrangements for vehicle parking off site.

#### 1.10 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
  - 1. Comply with limitations on use of public streets and other requirements of authorities having jurisdiction.
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
  - 1. Notify Construction Manager not less than twenty-one (21) days in advance of proposed utility interruptions.
  - 2. Do not proceed with utility interruptions without Construction Manager's and DCC Courts written permission.
- C. Noise, Vibration, and Odors: Operations that are to cause inordinately noisy operations, are to be conducted during times of non-occupant use. Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Notify Construction Manager not less than twenty-one (21) days in advance of proposed disruptive operations.
- D. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet (8 m) of entrances, operable windows, or outdoor air intakes. Use of tobacco products and other controlled substances within the existing building and on the Project site is not permitted.
- E. Pollution producing equipment shall not be located near air intakes where airborne smoke or fumes could be drawn into the building.
- F. Contractor Employee Identification: All workers on the site will be required to submit their name, date of birth, social security number, and driver's license number for a background check by the DC Court Security Office.
  1. Anyone failing the background check will not be allowed access to the site.
  2. Upon completion of the background check, each worker will be issued a security badge from the Owner.
  3. Security badges must be worn at all times by all persons entering the site.
    - a. The Contractor will be responsible for enforcement of this requirement.
    - b. The Court Security Officer (CSO) will perform unannounced checks to confirm this enforcement requirement.
- G. Employee Screening: Comply with Owner's requirements regarding drug and background screening of Contractor personnel working on the Project site.

#### 1.11 MISCELLANEOUS PROVISIONS

##### A. Security

1. Bidding Security Requirements: Bidders are required to comply with security regulations imposed by the occupying agency including any background checks. Access to the project site will be limited to specific times established by the Owner.
2. Construction Security Requirements: After award of the Contract, all Contractor employees shall be required to furnish information to allow for background checks. All information on the completed forms must be typed and all signatures must be original. Comply with security regulations as imposed by the occupying agency and submit the following forms:
  - a. Use form **Security Clearance Form and Criminal History Request** attached to this Section.
3. Secure Access: Notify the Owner/Construction Manager, or his designated representative not less than three (3) days prior to performing work in a security area.
  - a. Use form **Secure Access Request Form** attached to this Section.
4. Electrical Closet Access: Notify the Owner/Construction Manager, or his designated representative, not less than three (3) days prior to performing work in an Electrical Closet.
  - a. Use form **Request for Access to Electrical Closet with Instructions**, attached to this Section

5. Telecommunications Closet Access: Notify the Owner/Construction Manager, or his designated representative, not less than three (3) days prior to performing work in a Telecommunications Closet.
  - a. Use form **Request for Access Telecommunications Closet with Instructions**, attached to this Section.

B. General Security Regulations

1. Non-publicity: It is a specific condition of this Contract that the Contractor, or any subcontractors performing work on this project, shall not use or allow to be used any aspect of this project for publicity or advertising brochures.
2. Agency Security Regulations: All persons employed within the boundaries of the property or restricted-access areas therein, and all persons permitted to enter such property and areas shall comply with the security regulations that have been established for this Contract.
  - a. The Contractor agrees on behalf of himself and all subcontractors that the following security regulations will be observed by Contractor and subcontractor personnel on the property. The Contractor shall make it a specific provision of his subcontracts that these regulations be accepted.
  - b. At the commencement of the work under this Contract, the following security facilities and procedures will apply;
    - 1) The Contractor shall provide information about all Contractor and subcontractor personnel and others who require continuing access to the site, before access is required and when access ceases.
    - 2) In order to permit the Owner to supply badges for on-site personnel, the Contractor shall cause each individual to complete a personnel identification form. These forms will be provided by the Owner to the Contractor at the pre-construction conference. Processing of the forms will be performed by the Owner at Owner expense.
    - 3) When an individual reports to the site for work the first time, a period of 2-hours will be required for security processing, including review of identification forms and fabrication of a permanent badge. Personnel will then be permitted to go to work without further processing of identification forms by the Owner, but 15 minutes should be allowed each day for signing-in with security to obtain access to the site.
    - 4) The permanent badge furnished by the Owner to each Contractor employee or other person granted access to the site will serve to authorize the wearer to enter and leave the security area. The badge must be worn so as to be clearly visible at all times when on the work site. The badge will be retained by the individual as long as he requires continued admittance to the site, but the Contractor will arrange for its immediate return to the Owner when such need ceases.
      - a) Temporary or visitor badges will be provided for persons who are identified as having an infrequent or temporary legitimate business need for access to the site.
  - c. At the commencement of the work under this Contract, the following security procedures shall apply to the Contractor and all subcontractors.
    - 1) Comply with the security regulations of the project.

- 2) In the case of any questions as to the eligibility of an individual to obtain a pass, notify the Construction Manager, who will obtain a determination whether the individual can obtain a pass.
  - 3) Cameras are not permitted without written permission from the Owner. If approved, permission will be granted in writing and will provide additional guidelines.
    - a) Use form **Camera Letter Request Form** attached to this Section.
  - 4) Personnel may be subject to inspection of their personal effects when entering and leaving the facility. In addition, unscheduled inspections of personnel may be made while on site.
  - 5) If any work is canceled, notify Owner or his designated representative.
- d. The Owner reserves the right to close down the job site and order Contractor personnel off the premises in the event of a national emergency or a shut-down, for as long as security problems persist. The Contractor may only return to the site with verbal approval from the Owner or his authorized representative.
  - e. The Owner reserves the right to exclude or remove from the site or building any employee of the Contractor or a subcontractor whom the Owner deems incompetent, careless, insubordinate or otherwise objectionable, or whose continued employment on the work is deemed by the Owner to be contrary to the public interests. The Owner further reserves the right to complete processing of the security documentation for personnel assigned to work within restricted access areas prior to access to such areas by the personnel.
3. No interviews shall be conducted within the secured area. The Contractor and subcontractors will be required to maintain a field office, outside the limits established by the security area, for all public contacts. Applicants for employment and other persons not entitled to access to the secured area shall be required to contact the Contractor or subcontractor at these offices.
  4. Stricter access requirements will apply to enclosed areas. When access is granted it will be either for just visible areas or for all areas.

#### 1.12 ATTACHMENT FORMS

- A. Security Clearance Form and Criminal History Request.
- B. Secure Access Request Form.
- C. Request for Access to Electrical Closet with Instructions.
- D. Request for Access Telecommunications Closet with Instructions
- E. Camera Letter Request Form

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 1000

## DISTRICT OF COLUMBIA COURTS SECURITY CLEARANCE FORM

<b>COMPANY NAME:</b>				
<b>PROJECT MANAGER:</b>				
<b>EMPLOYEE NAME</b>	<b>DATE OF BIRTH</b>	<b>SOCIAL SECURITY NUMBER</b>	<b>STATE</b>	<b>DRIVER'S LICENSE NUMBER</b>

<b>WORKSITE:</b>	
<b>JOB DESCRIPTION:</b>	



Date of Request: (Numbers Only)		Metropolitan Police Department Washington, D.C Criminal History Request		Social Security Number: (Numbers Only)	
Request Record of: (Last, First, Middle Name)				Purpose of Request: <input type="checkbox"/> Law Enforcement (non-employment) <input type="checkbox"/> Visas* <input type="checkbox"/> Employment/ Licensing* <input type="checkbox"/> Challenge*	
Address:					
Sex:	Race:	Birthdate: (Numbers Only)	Place of Birth:		
Requesting Agency: <p style="text-align: center;">District of Columbia Courts</p>			Call-Back Number: <p style="text-align: center;">(202) 879-0496</p>		
Signature of Agent:				Badge No.:	
IDENTIFICATION AND RECORDS DIVISION USE ONLY - (Check if applicable)					
<input type="checkbox"/> SUBJECT UNDER ARREST		<input type="checkbox"/> CORRECT COLOR CODE			
Request Received By:		Date and Time Received:		Date and Time Returned:	
<p style="text-align: center;">D.C. Code § 6-2276 IS QUOTED HERE FOR YOUR INFORMATION</p> <p>It shall be an unlawful practice, punishable by a fine of not more than three-hundred dollars (\$300), or imprisonment for not more than ten (10) days, or both, for any person to require the production of and arrest record or any copy, extract, or statement thereof, at the monetary expense of any individual to whom such record may relate. Such "arrest records" shall contain only listings of convictions and forfeitures of collateral that have occurred within ten (10) years of the time at which such record is requested. (Dec. 13, 1977, D.C. Law 2-38, Title II, § 266, 24 DCR 6038).</p> <p>*I hereby authorize the release of my adult arrest record revealing convictions and forfeitures within the past ten (10) years.</p> <p style="text-align: center;">_____ Signature _____ Date</p>					

Name Search     Fingerprint Search

TO: Criminal History Users

This request concerns information whose collection, dissemination, and use are conditioned and restricted by applicable federal and District of Columbia statutes, and policy of the Metropolitan Police Department. Continued assistance from this department is conditioned upon your strict adherence to these regulations.

WARNING TO APPLYING AGENCIES: The Metropolitan Police Department does not guarantee either the accuracy of the record or that the individual whose record is furnished is actually the same individual whose record was requested. To obtain accuracy, the record of the Court involved should be examined. Positive identification can only be determined by comparable fingerprints. Records of arrests obtained from the Metropolitan Police Department as detailed on this form are for convictions and forfeitures for the past 10 years prior to the date of request of this record, exclusive of periods of imprisonment, if any. This record does not reflect any cases which may be currently pending before the Courts or cases where convictions have been set aside pending appeals.

CHIEF OF POLICE

Date of Arrest	Charge(s)	Disposition

Documents Released:

<input type="checkbox"/> Criminal History Record	<input type="checkbox"/> Photograph	<input type="checkbox"/> Other: _____
<input type="checkbox"/> Prosecution Report	<input type="checkbox"/> Fingerprints	<input type="checkbox"/> Other: _____







# SECURE ACCESS REQUEST FORM

Name of Contractor/Vendor:

Secure Area Requiring Access:

Date of Work:

The following task(s) will be performed:

TASK (S):

The following contact is giving authorization / permission to enter the secure area on the above date:

\_\_\_\_\_

Signature

Date

*NOTE: Your area will be protected from dirt and dust, and will be cleaned by the contractor. Any furniture moved will be returned to its proper place. All Chambers require the presence of the Courts Security Officer or Administrative Service Personnel, during the scheduled task(s). The designated individual will remain with the contractor while work is in progress.*

\_\_\_\_\_  
[If Required] Signature of Court Security Officer upon completion of above referenced work:

\_\_\_\_\_  
Date

\_\_\_\_\_  
Time

\_\_\_\_\_  
Signature of Project Manager that above area task (s) was completed and area was cleaned.

\_\_\_\_\_  
Date

\_\_\_\_\_  
Time



## REQUEST FOR ACCESS TO ELECTRICAL CLOSETS

DC Courts: Cable/ Wire Management



**DATE SUBMITTED:** \_\_\_\_\_

<b>LOCATION[S]:</b> BUILDING: _____ FLOOR: _____ CLOSET NAME: _____	<input type="checkbox"/> PRE-INSPECTION REQUESTED DATE SCHEDULED: _____
--	--

**VENDOR COMPANY NAME:** \_\_\_\_\_

**NAMES OF EMPLOYEES ASSIGNED TO WORK:**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

TYPE OF WORK:	DESCRIPTION OF WORK:
<input type="checkbox"/> DATA	_____
<input type="checkbox"/> VOICE	_____
<input type="checkbox"/> SECURITY	_____
<input type="checkbox"/> CABLE TV	_____
<input type="checkbox"/> ENERGY MANAGEMENT	_____
<input type="checkbox"/> ELECTRICAL	_____
<input type="checkbox"/> FIRE ALARM	_____
<input type="checkbox"/> RECORDING CABLE	_____
<input type="checkbox"/> OTHER	_____

**DATE[S] REQUESTED:** \_\_\_\_\_

<b>ACCESS APPROVAL GRANTED BY:</b>		<b>DATE:</b> _____
SIGNATURE: _____	PRINT NAME: _____	TITLE: _____
SIGNATURE: _____	PRINT NAME: _____	TITLE: _____

<b>PRE-INSPECTION REPORT:</b>	<b>DATE OF INSPECTION:</b> _____

<b>PRE-INSPECTION APPROVED BY:</b>		
SIGNATURE: _____	PRINT NAME: _____	TITLE: _____
SIGNATURE: _____	PRINT NAME: _____	TITLE: _____

USE THE ADDITIONAL INSPECTION REPORTS BELOW FOR PROJECTS REQUIRING MULTIPLE INSPECTIONS

**1ST FOLLOW-UP INSPECTION REPORT:** **DATE OF INSPECTION:** \_\_\_\_\_

**INSPECTION APPROVED BY:**

SIGNATURE: \_\_\_\_\_

PRINT NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

PRINT NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

**2ND FOLLOW-UP INSPECTION REPORT:** **DATE OF INSPECTION:** \_\_\_\_\_

**INSPECTION APPROVED BY:**

SIGNATURE: \_\_\_\_\_

PRINT NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

PRINT NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

**3RD FOLLOW-UP INSPECTION REPORT:** **DATE OF INSPECTION:** \_\_\_\_\_

**INSPECTION APPROVED BY:**

SIGNATURE: \_\_\_\_\_

PRINT NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

PRINT NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

**4TH FOLLOW-UP INSPECTION REPORT:** **DATE OF INSPECTION:** \_\_\_\_\_

**INSPECTION APPROVED BY:**

SIGNATURE: \_\_\_\_\_

PRINT NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

PRINT NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_



## Request for Access to Electrical Closets

TO: DC Courts Personnel, Contractors

FROM: James Vaughn, Chief Engineer

RE: Access to Electrical Closets  
Placement of Equipment in Closets

---

Please complete attached request form using the following instructions as a guide. Use one form per closet.

### Location section

Building: Enter the name of the building where the work is to be performed.

Floor: Identify the floor(s).

Closet Name: Identify the closet where the work is to be performed.

### Type and Description of Work

Type of Work: Check appropriate boxes for the type of work.

Description of Work: Provide a detailed description of the work and attach an 8 ½ X 11 sketch of the work/panel placement request area.

### Date(s) Requested

Provide the number of days you will need access to each closet.

### Approvals Granted by

The Chief Engineer will issue a closet access card for the duration needed to complete the work. The vendor will submit a Driver's license or Identification card in exchange for the closet access card. Access to the electrical closets will be restricted until approval is granted. Temporary access cards must be returned immediately after work is completed and Driver's License or Identification card will be returned.

### Follow-up Inspection

Future access to electrical closets requires a satisfactory rating during the follow-up inspection.



## REQUEST FOR ACCESS TO TELECOMMUNICATIONS CLOSETS

DC Courts: Cable/ Wire Management



**DATE SUBMITTED:** \_\_\_\_\_

<b>LOCATION[S]:</b> BUILDING: _____ FLOOR: _____ CLOSET NAME: _____	<input type="checkbox"/> PRE-INSPECTION REQUESTED DATE SCHEDULED: _____
--	--

**VENDOR COMPANY NAME:** \_\_\_\_\_

**NAMES OF EMPLOYEES ASSIGNED TO WORK:**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

TYPE OF WORK:	DESCRIPTION OF WORK:
<input type="checkbox"/> DATA	_____
<input type="checkbox"/> VOICE	_____
<input type="checkbox"/> SECURITY	_____
<input type="checkbox"/> CABLE TV	_____
<input type="checkbox"/> ENERGY MANAGEMENT	_____
<input type="checkbox"/> ELECTRICAL	_____
<input type="checkbox"/> FIRE ALARM	_____
<input type="checkbox"/> RECORDING CABLE	_____
<input type="checkbox"/> OTHER	_____

**DATE[S] REQUESTED:** \_\_\_\_\_

<b>ACCESS APPROVAL GRANTED BY:</b>		<b>DATE:</b> _____
SIGNATURE: _____	PRINT NAME: _____	TITLE: _____
SIGNATURE: _____	PRINT NAME: _____	TITLE: _____

<b>PRE-INSPECTION REPORT:</b>	<b>DATE OF INSPECTION:</b> _____

<b>PRE-INSPECTION APPROVED BY:</b>		
SIGNATURE: _____	PRINT NAME: _____	TITLE: _____
SIGNATURE: _____	PRINT NAME: _____	TITLE: _____

USE THE ADDITIONAL INSPECTION REPORTS BELOW FOR PROJECTS REQUIRING MULTIPLE INSPECTIONS

**1ST FOLLOW-UP INSPECTION REPORT:** **DATE OF INSPECTION:** \_\_\_\_\_

**INSPECTION APPROVED BY:**

SIGNATURE: \_\_\_\_\_

PRINT NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

PRINT NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

**2ND FOLLOW-UP INSPECTION REPORT:** **DATE OF INSPECTION:** \_\_\_\_\_

**INSPECTION APPROVED BY:**

SIGNATURE: \_\_\_\_\_

PRINT NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

PRINT NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

**3RD FOLLOW-UP INSPECTION REPORT:** **DATE OF INSPECTION:** \_\_\_\_\_

**INSPECTION APPROVED BY:**

SIGNATURE: \_\_\_\_\_

PRINT NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

PRINT NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

**4TH FOLLOW-UP INSPECTION REPORT:** **DATE OF INSPECTION:** \_\_\_\_\_

**INSPECTION APPROVED BY:**

SIGNATURE: \_\_\_\_\_

PRINT NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

PRINT NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_





## Request for Access to Communication Closets

TO: DC Courts Personnel, Contractors

FROM: ager

RE: Access to IT, Telecom and Electrical Closets  
Placement of Equipment in Closets

---

Please complete attached request form using the following instructions as a guide. Use one form per building.

### Location section

Building: Enter the name of the building where the work is to be performed.

Floor: Identify the floor(s).

Closet Name: Identify the closet where the work is to be performed.

### Type and Description of Work

Type of Work: Check appropriate boxes for the type of work.

Description of Work: Provide a detailed description of the work and attach an 8 ½ X 11 sketch of the work/panel placement request area.

### Date(s) Requested

Provide the number of days you will need access to each closet.

### Approvals Granted by

The Information and Communication Branch Manager will issue a closet access card for the duration needed to complete the work. The vendor will submit a Driver's license or Identification card in exchange for the closet access card.

Access to the electrical closets will be restricted until approval is granted.

Temporary access cards must be returned immediately after work is completed and Driver's License or Identification card will be returned.

### Follow-up Inspection

Future access to communications closets requires a satisfactory rating during the follow-up inspection.





## CAMERA LETTER REQUEST FORM

Contracting Company: \_\_\_\_\_

Contractor Contact Name: \_\_\_\_\_

Address: \_\_\_\_\_

Phone Number: \_\_\_\_\_

The above listed Contractor is requesting approval to take photographs within the construction areas of the following project:

Project Name: \_\_\_\_\_

The Contractor understands that in order to take photographs within the DC Court buildings a "Camera Letter" must be issued to the Contractor and a copy of this letter must be carried at all times by any member of the Contractor's staff that will be taking photographs. The Contractor understands that no photographs of any person will be taken in or around any DC Court buildings.

*Please return this completed form to Project Manager.*



## 01 2100 - ALLOWANCES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
  - 1. Allowances have been established for District of Columbia Superior Courts (DCSC) security required during construction.
    - a. If the District of Columbia Superior Courts (DCSC) advises that a Court Security Officer (CSO) is required while performing a portion of the work defined under this contract the Contractor may bill for the CSO against the allowance provided.
- B. Types of allowances include the following:
  - 1. Contingency allowance: Refer to "Instruction to Bidder" for allowance amount to be included in the solicitation quote.

#### 1.3 SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.
- B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.

#### 1.4 COORDINATION

- A. Coordinate allowance items with other portions of the Work.

#### 1.5 CONTINGENCY ALLOWANCES

- A. Use the contingency allowance only as directed by Construction Manager for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.
- B. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.
- C. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALLOWANCES

- A. Allowance No. 1 Contingency Allowance: Refer to "Instruction to Bidder" for allowance amount to be included in the solicitation quote, for Court Security Officer (CSO) required by District of Columbia Superior Courts (DCSC) during construction period for use according to Owner's instructions.

END OF SECTION 12 5900

## SECTION 01 2500 - SUBSTITUTION PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
  - 1. Section 01 2100 "Allowances" for products selected under an allowance.
  - 2. Section 01 6000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

#### 1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
  - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
  - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

#### 1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Substitution Request Form: Use facsimile of form provided in Project Manual.
  - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
    - b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
    - c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific

- features and requirements indicated. Indicate deviations, if any, from the Work specified.
- d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
  - e. Samples, where applicable or requested.
  - f. Certificates and qualification data, where applicable or requested.
  - g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
  - h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
  - i. Research reports evidencing compliance with building code in effect for Project.
  - j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
  - k. Cost information, including a proposal of change, if any, in the Contract Sum.
  - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
  - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor through Construction Manager of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Architect may determine in each case which of the modification forms in first subparagraph below is appropriate for incorporating a Contractor's substitution requests in the Contract Documents.
    - 1) Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
    - 2) Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

#### 1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

#### 1.6 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.



## PART 2 - PRODUCTS (Not Used)

### 2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - b. Substitution request is fully documented and properly submitted.
    - c. Requested substitution will not adversely affect Contractor's construction schedule.
    - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
    - e. Requested substitution is compatible with other portions of the Work.
    - f. Requested substitution has been coordinated with other portions of the Work.
    - g. Requested substitution provides specified warranty.
    - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after Notice to Proceed. Requests received after that time may be considered or rejected at the discretion of the Architect.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
    - b. Requested substitution does not require extensive revisions to the Contract Documents.
    - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - d. Substitution request is fully documented and properly submitted.
    - e. Requested substitution will not adversely affect Contractor's construction schedule.
    - f. Requested substitution has received necessary approvals of authorities having jurisdiction.
    - g. Requested substitution is compatible with other portions of the Work.
    - h. Requested substitution has been coordinated with other portions of the Work.
    - i. Requested substitution provides specified warranty.
    - j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 2500

## SECTION 01 2600 - CONTRACT MODIFICATION PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

- B. Related Requirements :

- 1. Section 01 2500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award

#### 1.3 MINOR CHANGES IN THE WORK

- A. Architect will issue through Construction Manager supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time on **Architect's Supplemental Instructions (ASI)** form included in this Section.

#### 1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Construction Manager will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

- 1. Proposal Requests issued by Construction Manager are not instructions either to stop work in progress or to execute the proposed change.
  - 2. Within 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
    - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    - c. Include costs of labor and supervision directly attributable to the change.
    - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
    - e. Change Proposal Request (CPR) Form: Use form **Change Proposal Request (CPR)** attached to this Section.

- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Construction Manager.
1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
  2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
  3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
  4. Include costs of labor and supervision directly attributable to the change.
  5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
  6. Comply with requirements in Section 01 2500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
  7. Proposal Request Form: Use form acceptable to the Owner.

#### 1.5 ADMINISTRATIVE CHANGE ORDERS

- A. Allowance Adjustment: Refer to Division 01 Section "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.

#### 1.6 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Proposal Request, Construction Manager will issue a **Contract Change Order (CCO)** for signatures of Owner and Contractor on form included in this Section.

#### 1.7 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Construction Manager may issue a **Construction Change Directive (CCD)** on Construction Manager standard form. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

- B. Documentation: Maintain detailed records as required by the Construction Change Directive.

#### PART 2 - PRODUCTS (Not Used)

#### PART 3 - EXECUTION

##### 3.1 ATTACHMENTS

- A. Architect's Supplemental Instructions (ASI)

- B. Change Proposal Request (CPR)
- C. Contract Change Order (CCO)

END OF SECTION 01 2600

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Architects, Planners & Interior Designers  
1505 Prince Street–Suite 200  
Alexandria VA 22314 USA

tel 703 836 9600

## Architect's Supplemental Instructions (ASI)

---

Date:

To:

Project:

Project Number:

ASI Number:

---

The Work shall be carried out in accordance with the following supplemental instructions issued in accordance with the Contract Documents without change in Contract Sum or Contract Time. Proceeding with Work in accordance with these instructions indicates acceptance without change in the Contract Sum or Contract Time.

---

Description:

Issued by:





# Change Proposal Request

---

PROJECT:

PROPOSAL REQUEST NUMBER:

DATE OF ISSUANCE:

OWNER:

District of Columbia Courts  
616 H Street, NW  
Sixth Floor  
Washington DC 20005

CONTRACT FOR:

CONTRACT DATED:

TO CONTRACTOR:

FROM CONSTRUCTION MANAGER:

Please submit a complete proposal, properly itemized and supported by sufficient substantiating data to permit evaluation as required by Section 7.3.3.1 of AIA A201–2017 for changes in the Contract Sum and Contract Time resulting from the proposed modifications to the Contract Documents described herein. Within ten (10) days of the date this Construction Proposal Request is issued, either submit the requested proposal or notify the Construction Manager, in writing, of the date on which the proposal submission is anticipated.

**THIS IS NOT A CHANGE ORDER, A CONSTRUCTION CHANGE DIRECTIVE OR A DIRECTION TO PROCEED WITH THE WORK DESCRIBED IN THE PROPOSED MODIFICATIONS.**

DESCRIPTION

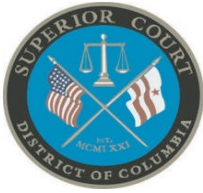
ATTACHMENTS

REQUESTED BY THE CONSTRUCTION MANAGER:

---

Name  
Title





**D.C. Courts**  
**[Name of Project]**  
**Contract Change Order**



**Date:** [Month/Day/Year]

**Contract Date:** [Month/Day/Year]

**CO #** [number]

**Contract Number:** [CPFMD-XX-XXXX]

**Contractor:** [Name of Company]  
 [Address]

**CO#:** [CO00XXXXXX]

The Contract is Changed as follows:

<b>PCR #</b>	<b>Description</b>	<b>Amount</b>
<b>Total</b>		<b>\$0.00</b>

**Not valid until signed by the Owner and Contractor**

Original contract price.....	\$0.00
Net Change by previously authorized Change Orders.....	\$0.00
Contract value prior to this Change Order.....	\$0.00
Contract will be <b>(increased)</b> <del>(decreased)</del> <del>(unchanged)</del> by this Change Order in the amount of.....	<b>\$0.00</b>
New Contract value including this Change Order will be.....	\$0.00
Contract Time will be <del>(increased)</del> <del>(decreased)</del> <b>(unchanged)</b> by.....	0 days
Date of Substantial Completion remains.....	[M/D/Y]
<b>Contract Period of Performance</b>	<b>From [M/D/Y] to [M/D/Y]</b>

By: \_\_\_\_\_

By: \_\_\_\_\_

Prepared &  
Reviewed By: \_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_

Contracting Officer Approval  
 District of Columbia Courts  
 616 H Street, NW Ste 622  
 Washington, DC 20001

[Contractor Company]  
 [Address]

By: \_\_\_\_\_

Date: \_\_\_\_\_

Funding Approval  
 District of Columbia Courts  
 616 H Street, NW Ste 622  
 Washington, DC 20001



## SECTION 01 2900 - PAYMENT PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections:
  - 1. Section 01 2100 "Allowances" for procedural requirements governing the handling and processing of allowances.
  - 2. Section 01 2600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
  - 3. Section 01 3200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.
  - 4. Section 01 3300 "Submittal Procedures" for administrative requirements governing the preparation and submittal of the submittal schedule.

#### 1.3 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

#### 1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule. Cost-loaded Critical Path Schedule to define the requirements for the schedule of values.
  - 1. Correlate line items in the schedule of values with other required administrative forms and schedules, including the following:
    - a. Application for Payment forms.
    - b. Submittal schedule.
    - c. Items required to be indicated as separate activities in Contractor's construction schedule.
  - 2. Submit the schedule of values to Construction Manager at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
  - 3. Sub-schedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide sub-schedules showing values correlated with each element.

- B. Format and Content: Submittals, Schedule as a guide to establish line items for the schedule of values. Provide at least one line item for each entry.
1. Identification: Include the following Project identification on the schedule of values:
    - a. Project name and location.
    - b. Name of Owner.
    - c. Owner's project number.
    - d. Contractor's name and address.
    - e. Date of submittal.
  2. Arrange schedule of values consistent with format of AIA Document G703.
  3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
    - a. Related Specification Section or Division.
    - b. Description of the Work.
    - c. Name of subcontractor.
    - d. Name of manufacturer or fabricator.
    - e. Name of supplier.
    - f. Change Orders (numbers) that affect value.
    - g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
      - 1) Labor.
      - 2) Materials.
      - 3) Equipment.
  4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of Contract Sum.
  5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
  6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
    - a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.
  7. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
  8. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
  9. Purchase Contracts: Provide a separate line item in the schedule of values for each purchase contract. Show line-item value of purchase contract. Indicate owner payments or deposits, if any, and balance to be paid by Contractor.
  10. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

- a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

11. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

#### 1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Construction Manager and paid for by Owner.
  1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: Application for Payment shall be for period of one calendar month, ending on the last day of the month. **Application for Payment** shall be submitted to Owner by the 25<sup>th</sup> of the following month.
  1. Submit for review by Owner's draft pencil copy of **Application for Payment** seven (7) days prior to due date.
- C. Application for Payment Forms: Use form Application for Payment attached to this Section
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Construction Manager will return incomplete applications without action.
  1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
  2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
  3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
  4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
  1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
  2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
  3. Provide summary documentation for stored materials indicating the following:
    - a. Materials previously stored and included in previous Applications for Payment.
    - b. Work completed for this Application utilizing previously stored materials.
    - c. Additional materials stored with this Application.
    - d. Total materials remaining stored, including materials with this Application.

- F. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Construction Manager by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
  2. When an application shows completion of an item, submit conditional final or full waivers.
  3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
  4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
  5. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.
- H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
  2. Schedule of values.
  3. Contractor's construction schedule (preliminary if not final).
  4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
  5. Products list (preliminary if not final).
  6. Schedule of unit prices.
  7. Submittal schedule (preliminary if not final).
  8. List of Contractor's staff assignments.
  9. List of Contractor's principal consultants.
  10. Copies of building permits.
  11. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  12. Initial progress report.
  13. Report of preconstruction conference.
  14. Certificates of insurance and insurance policies.
  15. Performance and payment bonds.
  16. Data needed to acquire Owner's insurance.
- I. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
  2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.



- J. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
  2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
  3. Updated final statement, accounting for final changes to the Contract Sum.
  4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
  5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
  6. AIA Document G707, "Consent of Surety to Final Payment."
  7. Evidence that claims have been settled.
  8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
  9. Final liquidated damages settlement statement.

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

### 3.1 ATTACHMENTS

- A. Application for Payment Form

END OF SECTION 01 2900

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# APPLICATION FOR PAYMENT

**to Owner:** District of Columbia Courts  
616 H Street, NW  
Sixth Floor  
Washington DC 20005

**Project:**

**Payment Application No.:**

**Distribution to:**

**Period to:**

OWNER:   
CM:

**CPFMD No.:**

**from Contractor:**

**via Const Manager:**

**Contract for:**

**Contract Date:**

## CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.  
Continuation Sheet, with Schedule of Values, is attached.

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous **Applications for Payment were made** and payments received from the Owner, and that current payment shown herein is now due.

- 1. Original Contract Sum \$ \_\_\_\_\_
- 2. Net change by Change Orders \$ \_\_\_\_\_
- 3. Contract Sum to Date (Line 1 ± 2) \$ \_\_\_\_\_
- 4. Total Completed and Stored to Date \$ \_\_\_\_\_
- 5. Retainage:
  - a. % of Completed Work \$ \_\_\_\_\_
  - b. % of Stored Materials \$ \_\_\_\_\_
  - Total Retainage ( Line 5a + 5b) \$ \_\_\_\_\_
- 6. Total Earned less Retainage (Line 4 less Line 5 Total) \$ \_\_\_\_\_
- 7. Less Previous Certificates for Payment (Line 6 from prior Certificate) \$ \_\_\_\_\_
- 8. Current Payment Due \$
- 9. Balance to Finish including Retainage (Line 3 less Line 6) \$ \_\_\_\_\_

**Contractor:**

By: \_\_\_\_\_ Date: \_\_\_\_\_

State of: \_\_\_\_\_ County of: \_\_\_\_\_  
Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_

Notary Public:  
My Commission expires: \_\_\_\_\_

## RECOMMENDATION FOR PAYMENT

The Quality Assurance Manager and the Construction Manager, based on on-site observations and the data comprising this application, verify to the best of their knowledge, the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and recommend payment to the Contractor of the amount requested on **Line 8**.

**Quality Assurance**

By: \_\_\_\_\_ Date: \_\_\_\_\_  
ASAP

**Construction Manager**

By: \_\_\_\_\_ Date: \_\_\_\_\_  
Versar, Inc.

## APPROVAL FOR PAYMENT

**District of Columbia Courts**

By: \_\_\_\_\_ Date: \_\_\_\_\_

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	\$	\$
Total approved this Month	\$	\$
TOTALS	\$	\$
NET CHANGES by Change Order	\$	



## SECTION 01 3100 - PROJECT MANAGEMENT AND COORDINATION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
  - 1. General project coordination procedures.
  - 2. Administrative and supervisory personnel.
  - 3. Coordination drawings.
  - 4. Requests for Information (RFIs).
  - 5. Project meetings.
- B. Related Requirements :
  - 1. Section 01 3200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
  - 2. Section 01 7300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
  - 3. Section 01 7700 "Closeout Procedures" for coordinating closeout of the Contract.

#### 1.3 DEFINITIONS

- A. RFI: Request from Contractor seeking information or interpretation of the Contract Documents during construction. Requests for information from Subcontractors will not be answered. RFI's will be returned for reasons including but not limited to: requests for substitutions, money, time, forgiveness, direction, and means and methods.

#### 1.4 INFORMATIONAL SUBMITTAL

- A. A detailed 4-week look-ahead schedule shall be submitted once a week by the close of business on the last day of the previous week's work. The schedule shall include the following:
  - a. Specific location of work for each trade.
  - b. Description of work for each trade.
  - c. Number of persons who will be on site for each location and trade.
  - d. Specific impacts required, such as equipment or utility shutdowns.
  - e. Hours of operation.

#### 1.5 COORDINATION

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
  3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's construction schedule.
  2. Preparation of the schedule of values.
  3. Installation and removal of temporary facilities and controls.
  4. Delivery and processing of submittals.
  5. Progress meetings.
  6. Preinstallation conferences.
  7. Project closeout activities.
  8. Startup and adjustment of systems.
  9. Project closeout activities.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

#### 1.6 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings in accordance with requirements noted below, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or where coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity. Coordination drawings must be submitted to the Architect and be reviewed prior to the start of any new Work. Any Work that proceeds without proper coordination drawings is at the sole risk of the Contractor. No payment applications will be processed for Work that was conducted without approved coordination drawings.
1. Content: Project-specific information, drawn accurately to a minimum ¼ inch scale plan, elevation and section drawings, to indicate and resolve conflicts. Drawings submitted shall be CAD electronic files preferably utilizing latest release of AutoCAD showing: partitions, fire/smoke rated barriers, ceiling heights, structural framing locations and elevations, column lines, and other related work. After Subcontractor's written approval of coordination drawings, Contractor shall determine method used to resolve interferences not previously identified. Contractor shall give written approval of changes

to coordination drawings prior to start of work. Maintain one working copy of current approved Coordination Drawings at project site. The Contractor's resolution to coordination issues of various subcontractor's should not directly impact the intent of architectural elements of the project such as ceilings, walls, and chases. Do not base coordination drawings on standard printed data. Include the following information, as applicable::

- a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
- b. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
- c. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
- d. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
- e. Indicate required installation sequences.
- f. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire protection, fire alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings to adequately represent the Work. Coordination Drawings shall indicate horizontal and vertical dimensions to avoid interference with structural framing, ceilings, partitions, equipment, lights, mechanical, electrical, conveying systems, and other services including but not limited to: In and above ceilings, within walls, within chases, in mechanical spaces, and in electrical spaces. Work out all "tight" conditions involving Work in advance of installation. Prior to the start of any work and installation in any given area, Contractor shall approve and sign Coordination Drawings affecting the Contractor/Subcontractor's work in that area. Modifications required as a result of failure to resolve interferences, provide correct coordination drawings or call attention to changes required in other work as a result of modifications shall be paid for by the Contractor. The Contractor shall coordinate with all DC Court Vendor's during the coordination drawing and review process.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire protection, fire alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines. Provide sleeve, core drill, and blockout layout drawings: Drawings shall show at a minimum, proposed locations and sizes of sleeves, core drill blockouts, and embedded items in concrete walls, columns, floors, and beams.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.

6. Mechanical and Plumbing Work: Show the following:
  - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
  - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
  - c. Fire-rated enclosures around ductwork.
7. Electrical Work: Show the following:
  - a. Runs of vertical and horizontal conduit 1-inch diameter and larger.
  - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire alarm locations.
  - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
  - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
8. Fire Protection System: Show the following:
  - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
9. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are the Contractor's responsibility. If the Architect determines that the coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, the Architect will so inform the Contractor, who shall make changes as directed and resubmit.
10. Coordination Drawing Prints: Prepare coordination drawing prints in accordance with requirements of Section 01 3300 "Submittal Procedures."

#### 1.7 KEY PERSONNEL

- A. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including office, and cellular telephone numbers and email addresses. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
  1. Post copies of list in project meeting room, and by each temporary telephone. Keep list current at all times.

#### 1.8 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified and submitted simultaneously to Architect and Construction Manager for cost and time impact review by Construction Manager. Construction Manager shall forward Architect's RFI response to Contractor within two working days of receipt. The Construction Manager should copy the Architect when returning the response to the Contractor. No modifications to the Architect's RFI response can be made without the Architect's permission. .
  1. RFIs submitted by entities other than Contractor will be returned by Architect with no response.



2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors. Provide potential solution(s) on each RFI submitted.
  3. Do not issue RFI as request for substitution. Architect will return such RFI with notification to submit proper "Request for Substitution" as per Section 01 2500 "Substitution Procedures".
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
  2. Project number.
  3. Date.
  4. Name of Contractor.
  5. Name of Architect and Construction Manager.
  6. RFI number, numbered sequentially.
  7. RFI subject.
  8. Drawing number and detail references, as appropriate.
  9. Field dimensions and conditions, as appropriate.
  10. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact of both in the RFI.
  11. Contractor's signature.
  12. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: Contractor to submit an RFI form for approval by the Owner.
- D. Architect's Action: Architect will review each RFI and forward it to the Construction Manager who will then forward it to Contractor. Allow seven (7) working days for Architect's response for each RFI. RFIs received by Architect on or after 1:00-p.m. will be considered as being received the following working day.
1. If, in the opinion of the Architect, the RFI is too complicated, and will require coordination with other components, and it will take more than seven (7) days to properly respond to, the Architect will notify the Contractor through the Construction Manager of the required time within seven (7) days
  2. The following RFIs will be returned without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for coordination information already indicated in the Contract Documents.
    - d. Requests for adjustments in the Contract Time or the Contract Sum.
    - e. Requests for interpretation of Architect's actions on submittals.
    - f. Incomplete RFIs or inaccurately prepared RFIs.
    - g. Asking the same RFI after it has already been answered previously.
    - h. Asking an RFI about Work that has already been installed out of sequence.
    - i. RFI's that are used for communication or correspondence.
    - j. RFI's that are not a question.

3. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
  4. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01 2600 "Contract Modification Procedures."
    - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Construction Manager in writing within 10 working days of receipt of the RFI response. The Construction Manager shall immediately notify Architect of the Contractor's response.
- E. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties.
- F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. RFI log shall contain not less than the following information:
1. Project name.
  2. Name and address of Contractor.
  3. Name and address of Architect and Construction Manager.
  4. RFI number including RFIs that were dropped and not submitted or returned without action.
  5. RFI description.
  6. Date the RFI was submitted.
  7. Date Architect's and Construction Manager's response was received.
  8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

#### 1.9 PROJECT MEETINGS

- A. General: Construction Manager will schedule and conduct meetings and conferences at Owner's Conference Room or Project site, unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
  2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees three working days prior to the scheduled meeting.
  3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, Construction Manager, and Architect, within one day of the meeting.
- B. Pre-construction Conference: Construction Manager will schedule and conduct a pre-construction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
1. Attendees: Authorized representatives of Owner, Owner's Quality Control and Quality Assurance Representative, Construction Manager, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  2. Agenda: Discuss items of significance that could affect progress, including the following:
    - a. Tentative construction schedule.
    - b. Phasing.

- c. Critical work sequencing and long-lead items.
  - d. Designation of key personnel and their duties.
  - e. Lines of communications.
  - f. Procedures for processing field decisions and Change Orders.
  - g. Procedures for RFIs.
  - h. Procedures for testing and inspecting.
  - i. Procedures for processing Applications for Payment.
  - j. Distribution of the Contract Documents.
  - k. Submittal procedures.
  - l. Sustainable design requirements.
  - m. Preparation of record documents.
  - n. Use of the premises and existing building.
  - o. Work restrictions.
  - p. Working hours.
  - q. Owner's occupancy requirements.
  - r. Responsibility for temporary facilities and controls.
  - s. Procedures for moisture and mold control.
  - t. Procedures for disruptions and shutdowns.
  - u. Construction waste management and recycling.
  - v. Parking availability.
  - w. Office, work, and storage areas.
  - x. Equipment deliveries and priorities.
  - y. First aid.
  - z. Security.
  - aa. Progress cleaning.
  - bb. Coordination Drawings.
3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Contractor shall schedule and conduct a pre-installation conference in coordination with project team at Project site before each construction activity that requires coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect, Construction Manager of scheduled meeting dates.
  - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    - a. Contract Documents.
    - b. Options.
    - c. Related RFIs.
    - d. Related Change Orders.
    - e. Purchases.
    - f. Deliveries.
    - g. Submittals.
    - h. Review of mockups.
    - i. Possible conflicts.
    - j. Compatibility problems.
    - k. Time schedules.
    - l. Weather limitations.
    - m. Manufacturer's written recommendations.
    - n. Warranty requirements.

- o. Compatibility of materials.
    - p. Acceptability of substrates.
    - q. Temporary facilities and controls.
    - r. Space and access limitations.
    - s. Regulations of authorities having jurisdiction.
    - t. Testing and inspecting requirements.
    - u. Installation procedures.
    - v. Coordination with other work.
    - w. Required performance results.
    - x. Protection of adjacent work.
    - y. Protection of construction and personnel.
  3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
  4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
  5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: Construction Manager will schedule and conduct a Project closeout conference, at a time convenient to Owner and Architect, but no later than 30 days prior to the scheduled date of Substantial Completion.
  1. Attendees: Authorized representatives of Owner, Owner's Quality Control and Quality Assurance Representative, Construction Manager, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  2. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
    - a. Preparation of record documents.
    - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    - c. Submittal of written warranties.
    - d. Requirements for preparing operations and maintenance data.
    - e. Requirements for demonstration and training.
    - f. Preparation of Contractor's punch list.
    - g. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
    - h. Submittal procedures.
    - i. Coordination of separate contracts. Contractor is required to help coordinate and schedule the work under separate contracts, [i.e. Furniture, Security, Low Voltage Cabling, etc.], but is not required to manage the teams or process.
    - j. Owner's partial occupancy requirements.
    - k. Installation of Owner's furniture, fixtures, and equipment.
    - l. Responsibility for removing temporary facilities and controls.
  3. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: Construction Manager will conduct progress meetings at weekly intervals.
  1. Attendees: In addition to representatives of Owner, Owner's Quality Control and Quality Assurance Representative, Construction Manager, and Architect and their consultants,

- each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      - 1) Review schedule for next period.
    - b. Review present and future needs of each entity present, including the following:
      - 1) Interface requirements.
      - 2) Sequence of operations.
      - 3) Status of submittals.
      - 4) Deliveries.
      - 5) Off-site fabrication.
      - 6) Access.
      - 7) Site utilization.
      - 8) Temporary facilities and controls.
      - 9) Progress cleaning.
      - 10) Quality and work standards.
      - 11) Status of correction of deficient items.
      - 12) Field observations.
      - 13) Status of RFIs.
      - 14) Status of proposal requests.
      - 15) Pending changes.
      - 16) Status of Change Orders.
      - 17) Pending claims and disputes.
      - 18) Documentation of information for payment requests.
      - 19) Status of Coordination Drawings
  3. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
    - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- F. Coordination Meetings: General Contractor shall schedule and conduct project coordination meetings as required to address issues with the Coordination Drawings. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: In addition to representatives of Owner, Owner's Quality Control and Quality Assurance Representative, Construction Manager, and Architect, and their consultants, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be

- represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
    - b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
    - c. Review present and future needs of each contractor present, including the following:
      - 1) Interface requirements.
      - 2) Sequence of operations.
      - 3) Status of submittals.
      - 4) Deliveries.
      - 5) Off-site fabrication.
      - 6) Access.
      - 7) Site utilization.
      - 8) Temporary facilities and controls.
      - 9) Work hours.
      - 10) Hazards and risks.
      - 11) Progress cleaning.
      - 12) Quality and work standards.
      - 13) Change Orders.
  3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 3100

## SECTION 01 3200 - CONSTRUCTION PROGRESS DOCUMENTATION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including, but not limited to, the following:

1. Start-up construction schedule.
2. Contractor's construction schedule (CPM).
3. Daily construction reports.
4. Material location reports.
5. Field condition reports.
6. Special reports.

- B. Develop a detailed Network Plan utilizing the most current version of Primavera Project Planner demonstrating complete fulfillment of all Work shown in the contract documents. Regularly update the Network Plan in accordance with the requirements of this Section, and utilize it in planning, coordinating, and performing all the Work under this contract. Schedule activities shall accurately depict the entire scope of work to be performed to complete the project including, but not limited to, all activities of subcontractors, consultants, equipment vendors and suppliers, DC Courts, and others, as required.

- C. The purpose of the Project Schedule shall be to:

1. Ensure adequate planning, staffing, scheduling and reporting during execution of the Work by the Contractor;
2. Ensure coordination of the Work among all affected parties;
3. Assist the Contractor and DC Courts in the preparation and evaluation of the Contractor's monthly progress payments.
4. Assist the Contractor and DC Courts in monitoring the progress of the work, and evaluating proposed changes to the Contract and/or requests for additional time to Project Completion.

- D. Related Requirements: :

1. Section 01 3300 "Submittal Procedures" for submitting schedules and reports.
2. Section 01 4000 "Quality Requirements" for submitting a schedule of tests and inspections.

#### 1.3 DEFINITIONS

- A. Definitions applicable to this Section include the following:

- B. Activity: An element of the Work or task performed during the course of the project. Each schedule activity shall be a clearly defined and manageable task depicting an expected duration, an expected cost, and expected resource requirements.
- C. Baseline Schedule: The original work plan approved by DC Courts as the Project Schedule.
- D. Constraint: A scheduling restriction imposed on the start or finish of an activity. Only contractual/Owner-designated constraints are allowed.
- E. Critical Path: The Project primary critical path is defined as the path with the least amount of total float which constitutes the longest, continuous path of interrelated activities depicting project work from Notice of Award (or NTP) to project completion. All reports and graphics indicating the Critical Path shall depict the longest path of interrelated activities. Unless otherwise approved by DC Courts, the Baseline Schedule Critical Path shall use all allotted Contract time.
- F. Critical Path Method (CPM): A scheduling technique utilizing activities, durations, and interrelationships/dependencies (logic), such that all activities are interrelated with logic ties from the beginning of the project to the completion of the project.
- G. Data Date: The data date of each schedule update shall be the first calendar day of each month and represent all work performed through the last calendar day of the preceding month.
- H. Float: Is the difference between the planned early dates and the planned late dates; the amount of time an activity can be delayed without affecting the Substantial Completion Date. Float is considered a project commodity jointly shared between DC Courts and the Contractor and shall be used in the best interest of completing the Project on time.
- I. Float Suppression: Utilization of zero free float constraints which allows an activity to start as late as possible by using all its' available free float. This technique allows activities to appear more critical than if the activity's total float was based on early dates. Assigning zero free float prevents true sharing of total float between DC Courts and the Contractor.
- J. Fragnet: A subset group of interrelated activities representing only a portion of the CPM schedule.
- K. Key Plans: Key Plans are graphic representations on prints of the Contract Documents of the Contractor's planned breakdown of the project for scheduling purposes. The key plans will clearly define the boundaries of the work for each designated area. The alphanumeric codes on the key plans shall match the code values for the activity code "Area" in the Project schedule.
- L. Network Plan: The Network Plan is the entire database of activities, logic, durations, and all items relating to any activity input into the scheduling software and is the complete representation of the Project Schedule prepared using the Critical Path Method and graphically shown in a time-scaled form. The network shows the sequence and interdependence of the activities, and planned and actual progress by activity, required for complete performance of the Work.
- M. Project Group: A means used in Primavera Project Planner to divide a large project into smaller projects but allow resources and costs to be used across all projects. Establishing a Project Group reporting can be summarized or detailed across one or all projects. A project within a Project Group may include procurement activities.



- N. Project Schedule: The Project Schedule includes the Preliminary Schedule (submitted at bid or as determined by the CO), the approved Baseline Schedule (developed based on the Preliminary Schedule), and all subsequent Schedule Updates, Schedule Revisions, Recovery Schedules, and As-Built Schedule.
- O. Recovery Schedule: A schedule depicting the Contractor's plan for recovery of time lost on the project, through no fault of the DC Courts.
- P. Schedule Revision: A schedule in which the plan for the work is revised. A Schedule Revision is required when the current schedule no longer represents the actual or planned prosecution of the Work.
- Q. Schedule Update: A schedule in which only progress is updated from the prior data date to the current data date. No revisions to logic ties will be permitted in a Schedule Update.
- R. Time Impact Analysis: A technique to demonstrate the comparison of the time impact for each schedule revision or proposed revision against the current approved Project Schedule.
- S. Total Float: The amount of time an activity (or chain of activities) can be delayed without affecting the Project Substantial Completion Date.
- T. Working Day: A Working Day is a calendar day scheduled for active prosecution of the work.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
  - 1. Color PDF electronic file.
- B. Start-up construction schedule.
  - 1. Approval of cost-loaded start-up construction schedule will not constitute approval of schedule of values for cost-loaded activities.
- C. Start-up Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
  - 1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.
- E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in work days.
  - 1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
  - 2. Total Float Report: List of all activities sorted in ascending order of total float.

3. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.

F. Daily Construction Reports: Submit at weekly intervals.

G. Material Location Reports: Submit at weekly intervals.

H. Field Condition Reports: Submit at time of discovery of differing conditions.

I. Special Reports: Submit at time of unusual event.

J. Qualification Data: For scheduling consultant.

#### 1.5 QUALITY ASSURANCE

A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Owner's request.

B. Prescheduling Conference: General Contractor shall conduct conference at Project site to comply with requirements in Section 01 3100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including work stages, area separations, interim milestones and partial Owner occupancy.
4. Review delivery dates for Owner-furnished products.
5. Review schedule for work of Owner's separate contracts.
6. Review time required for review of submittals and resubmittals.
7. Review requirements for tests and inspections by independent testing and inspecting agencies.
8. Review time required for completion and startup procedures.
9. Review and finalize list of construction activities to be included in schedule.
10. Review submittal requirements and procedures.
11. Review procedures for updating schedule.

#### 1.6 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's construction schedule, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

## PART 2 - PRODUCTS

### 2.1 CPM CONSTRUCTION SCHEDULE

- A. Within 14 calendar days after receipt of Contract Award Letter or the Notice to Proceed (which ever date is earlier), prepare and submit to the Contracting Office (CO), for approval, a Detailed Baseline CPM Construction Schedule including the full project logic of predecessors and successors.
1. This schedule shall be done in either, the Suretrak, Primavera P3, or Primavera Contractor scheduling packages.
  2. This schedule must include sufficient detail to fully define all aspects of the Base Contract, accepted Project Options, and the related Procurement requirements for both the Base Contract and the accepted Project Options.
  3. The final number of separate activity tasks for the Detailed Baseline CPM Construction Schedule must be approved by the Contracting Office. The total scheduled construction time frame must equal the total contract duration.
- B. The Contracting Officer (CO) or the Contracting Officer's Technical Representative (COTR) will review and comment upon the detailed Baseline CPM Construction Schedule submittal within 7 calendar days of its receipt by Contracting Officer. An onsite project meeting may be required by the COTR to review these comments with the Contractor and the contractor's CPM scheduling person.
1. Within 7 calendar days of receipt of the COTR review comments, the contractor shall submit the Final Baseline CPM Construction Schedule incorporating all of the final review comments.
  2. The Final Baseline CPM Construction Schedule shall contain cost loading for all work activities and any requested Material-On-Site activities as approved by the Contracting Officer.
- C. Within 7 calendar days of receipt of the Final Baseline CPM Construction Schedule, including activity costs, the Contracting Officer or the COTR shall review for final approval, the activity selection, activity logic, and activity cost loading.
1. The cost loading will be reviewed based upon the cumulative "S" curve defining the total costs associated with this contract.
  2. The total project budget must equal the contract amount. Any changes required by the Contracting Officer or the COTR must be made prior to the first project update for payment purposes and a Final Approved Baseline CPM Construction Schedule must be submitted to the Contracting Officer.

### 2.2 CONSTRUCTION SCHEDULE NAS FORMAT

- A. Basic Schedule Requirements:
1. In General, projects of the D.C. Courts are considered to be Renovation of Existing Condition Projects. As such, it is to be understood by all parties that an occasional "differing site condition" will be encountered. Therefore it is essential for the Contractor awarded any project to take control of the site defined within the scope of work within his or her Contract as soon as possible and to begin the investigation to understand the existing conditions. Unless otherwise required elsewhere in this specification, the Contractor is to actively implement, and detail within the project schedule, the following contract requirements:

- a. Take possession of and begin to Survey and Document all areas of the Project Work Site within 14 Calendar Days, or less, of the Project Notice to Proceed Date.
  - b. Begin to Salvage Items as Required, Install Area/Item Protections as necessary and Open Ceilings within all Areas available to the Contractor, within 21 Calendar Days, or less, of the Project Notice to Proceed Date.
  - c. Begin Demolition as necessary by this Contract within 28 Calendar Days, or less, of the Project Notice to Proceed Date. All contractually necessary Administrative Plans and Permits shall be submitted to the Owner a minimum of 7 Calendar Days for Review & Approval, prior to commencing project Demolition.
2. The schedule shall have no more than 1 project Calendar. This Calendar will show the Contractor's planned work week along with all planned Holidays. Weekend work or other "off hour work" may be identified in the Activity Description with an indication of when it is proposed to be accomplished.
- a. For projects containing a significant amount of weekend work, it is recommended that this single calendar be done in a 7 work day format with non-work holidays as appropriate.
3. The schedule shall be numbered strictly with "numeric values". Alphabetical activity numbers will be a basis for rejection. "Zero Fill" to the left of any numeric Activity ID number will not be accepted.
4. General Conditions such as Salaries, Energy/Communication Costs, and Project Length Rentals such as Trailers, Port-a-Johns, etc. may form the bases for the cost loading of a Monthly Series of separate "General Condition Activities" for each month of the Contract Duration.
5. Cost loaded General Requirement activities will not be accepted. Items such as Bond, Lump Sum Insurance or Bond Payment, Layout, Cleaning and any other "Specific Event" activities for which the Contractor wishes to be paid at the time of the event must be treated as any other Cost Loaded Work Activity.
6. The Scheduled percent complete determining the cost earned value and the remaining duration is to be linked together at all times. The D.C. Courts will process all payments based upon the updated computer generated total Earned Value amount, unless determined otherwise by the COR. As such, the computer generated percent expended should always be the same as the scheduled percent complete value.

B. Schedule Format:

1. The Contractor shall use the critical path method for the development of all construction schedules
2. If the project is developed in Primavera P3, the Computer ID Code must be 4 characters in length. The first two characters are of the Contractor's choice. Interim schedule developmental until final approval is to have A1, A2, A3, etc. for the final two Computer ID Code characters. The Final Approved Baseline CPM Construction Schedule must have "00" as the 3rd and 4th ID character. Each project update of the Final Approved Baseline CPM Construction Schedule is to advance sequentially by 1 unit; --01, --02, etc. If the project is developed in Suretrak, the same numbering requirements shall apply to the final two characters of the Suretrak naming format.

3. At a Minimum, the Schedule is to include Construction “Demolition”, “Rough In” and “Trim out” time for all major systems and components. All Construction Activities must represent work performed by a single Contractor/Sub Contractor Trade Responsibility. Multiple Trade Responsibility identification such as MEP will not be accepted. The maximum allowable duration for “work in place” activities shall be 10 working days.
4. The Schedule shall include one series of procurement activities for each separate “Key” or “Long Lead” material specification section. Key is defined as necessary on the Project Work Site within 2-months or less following the NTP Date. Long Lead is defined as an item that requires 2-months or more to Fabricate and Deliver to the Project Work Site, following Approval and subsequent Release for Fabrication by either the Court’s Representative or the Reviewing A/E. Each series shall contain separate activity tasks representing the following items, in the sequence listed:
  - a. Prepare/Submit (By Contractor or Sub Contractor.)
  - b. Review/Approve (By Owner with a 10 work day duration.)
  - c. Fabricate/Deliver (By Contractor or Sub Contractor with sufficient time to adequately receive the material in question, at the project site, after its release for production.)
  - d. Material-On-Site (Optional by Contractor or Sub Contractor if allowed by the Contracting Officer. This activity shall have a “zero” day work duration and will be used only for cost loading of major items of costs where such item is not planned to be installed within the next payment period, after its receipt to the project site or other Contracting Officer approved off site facility. All Contracting Officer requirements pertaining to payment of Material-On-Site must be met by the Contractor and approved by the Contract Officer prior to its acceptance for payment.
5. The Schedule shall include one series of “plan development” activities for each contract required “plan” relating to environmental issues, project protections, and demolition (hazardous or general). Approval of each “plan” shall restrain commencement of any related contract work on the project site. Each series shall contain separate activity tasks representing the following items, in the sequence listed:
  - a. Prepare/Submit (By Contractor or Sub Contractor.)
  - b. Review/Approve (By Owner with 5-work day duration.)
6. The Schedule shall include the following separate test and activation activities where appropriate: :
  - a. Testing of all wet systems prior to “system insulation” completion or “wall/ceiling closure”, whichever occurs first. Allow a minimum of 1 work day.
  - b. Inspection by Owner of all walls before final closure. Allow 1 work day for final approval of this close-up inspection for each separate area defined within the schedule.
  - c. Inspection by Owner of all ceilings before final closure whether this be with gyp board or acoustic ceiling tile placement. Allow 1 work day for final approval of this close-up inspection for each separate area defined within the schedules.
  - d. Test & Balance of HVAC Wet System. Allow sufficient time as separate and following the Commissioning of the major Mechanical Systems.

- e. Test & Balance of HVAC Dry System. Allow sufficient time as separate, and following any Test & Balance of the HVAC Wet Systems.
  - f. Test & Demonstrate each separate Electrical System. Allow sufficient time.
  - g. Pre Final Inspection by Contractor upon completion of all major Surfaces, Items, Doors/Hardware and Systems. Allow 5 work days.
  - h. Final Inspection by Owner. Allow 5 work days following the Contractor's Pre Final Inspection and all Test & Balance or Test & Demonstrate activities.
  - i. Punch List of final project by the Contractor. Allow 5 work days following the Owner's Final Inspection.
  - j. Final Acceptance by Owner. Allow 1 work day following the Contractor's Punch List of the final project.
7. Each activity shall have at a minimum sufficient coding to define the trade responsible (RESP) for the work in question, its vertical floor level physical location (AREA) and its horizontal (subdivision of floor area, wing, or mechanical room) physical location (LOC).
- a. The "vertical code" location shall be utilized for coding identifying Administrative, Design, Site and Procurement tasks.
  - b. Additional coding to segregate separate Fragnets of work shall be at the contractor's option.
  - c. All Trade Coding shall be intuitive and generic with alpha characters such that any person reading this schedule would readily understand the responsible part for this work task. Examples would be OWN = Owner, EL = Electrical, ELSYS = Electrical Systems.
  - d. All Area Coding shall be intuitive with alpha/numeric characters.
  - e. All Coding shall be clearly and fully described within the Scheduling Program's Code Definition program.

C. Computer Generated Schedule Output

1. The following computer generated reports shall be submitted as a PDF File and 5 hard copies for the Detailed Baseline CPM Construction Schedule, the Final Baseline CPM Construction Schedule, the Final Approved Baseline CPM Construction Schedule and any required follow on Project Update Schedules:
  - a. Activity List Report with predecessors and successors indicated. – Use 7 point font on these two data columns. Other columns are: ID/Desc/ /Resp/AREA/LOC/Orig Dur/Rem Dur/% complete/ES/EF/LS/LF/TFL. This report contains all activities and is sorted by "Activity ID". This report is "letter size" printed in "landscape layout".
  - b. Total Float Report with the following columns: ID/Desc/Resp/AREA/LOC/ Orig Dur/Rem Dur/% complete/ES/EF/LS/LF/TFL. This report contains all "not completed" activities and shall be sorted by "Total Float" and then by "Early Finish". This report is "letter size" printed in "landscape layout".
  - c. (For Cost Loaded Schedules only.) Cost Report with the following columns: ID/Desc/Resp/ AREA/LOC/ Orig Dur/Rem/% complete Dur/ES/EF/AS/AF/Budgeted Cost/Earned Value. This report contains all activities and is sorted by "Activity ID", and is banded by "Responsibility" with dollar value totals listed at the bottom of each Responsibility Band and with the total Project dollar value listed on the last line of this report. This report is "letter size" printed in "landscape layout".

- d. Look Ahead Report showing all remaining activities with an early start date falling between the DD and DD + 8 weeks, and where these same activities have a "Float" number of less than 6 weeks. Sort activities by "Early Finish". The form of this report is to be with columns and bars. Band this report by Area with the following columns: ID/Desc/Resp/AREA/LOC /Rem Dur/% Complete/ES/EF. The bars can be monochrome or color but should show the early bars in green or gray and critical bars in red or black. Milestones should be Orange or Black. Show the Data Date Line in Blue or Black and the entire graphic window should display the time period extending from -1 week to +4 weeks. Show progress either in blue or as an open bar with cross hatching. Put a legend at the top or bottom. Title the top of this report as: "LOOK AHEAD REPORT". This report is "letter size" printed in "landscape layout".
- e. Detailed Activity Graphic Report in either color or monochrome as outlined above. Show all activities and milestones. Show completed activities as well as those with progress and those yet to have started. Sort on "Early Start". Band by "AREA & LOC" with the following columns: ID/Desc/Resp/Orig Dur/Rem Dur/% Complete/ES/EF. Show activity description adjacent to each bar. Do not show logic. Window width is from - 1 week from SD to FD + long enough to avoid text clipping. Time scale to equal 1 page wide. Put a legend at the top or bottom of each page. Title the top of this report as: "CONSTRUCTION SCHEDULE". This report is "11"X17" size" printed in "landscape layout".
- f. The Contracting Officer or the COTR may elect to waive any of the above listed requirements for any of the "hard copy" schedule requirements.
- g. With each submittal of the Detailed Baseline CPM Construction Schedule, the Final Baseline CPM Construction Schedule, and the Final Approved Baseline CPM Construction Schedule, made to the Contracting Officer, the Contractor shall also submit one CD disk with an electronic copy of the current submittal placed on it. This electronic copy is to be in the form of the ".PRX" file generated through use of either the Suretrak or Primavera "Back Up Utility" with "compression" and "shared layouts" marked "on". This diskette is to be labeled with the following information:
  - 1) Computer ID Code.
  - 2) Project Name.
  - 3) Contract Number.
  - 4) Contractor's Name.
  - 5) Date of Submittal.

### 2.3 PROJECT UPDATE FORMAT

- A. Projects will have their project status monitored through a process of periodic computer reviews that shall commence immediately following submission of the Initial Construction Schedule and proceed monthly unless deemed as necessary to be held more frequently by the COTR. These Schedule Meetings shall then continue periodically thru to the end of the project.
  1. Projects with contract durations of less than twelve months will have their project status monitored through a process of periodic computer reviews that shall not exceed a "bi weekly" review period. At the Contracting Officer's discretion these periodic computer reviews may be processed at more frequent intervals.
  2. For Projects with contract durations of more than twelve months, the Contracting Officer may require these computer reviews to be processed onsite where in the Contractor will jointly review the computer activity list, make his request for item completion status, and have it pre-verified or negotiated immediately by the (COTR). Computer reviews processed on a monthly basis shall require the Contractor to "mark up" a computer activity list with the requested completion status and to deliver this status "mark up" to the

(COTR) three work days prior to the onsite status meeting. Final acceptance/negotiation of the requested activity status will occur during the onsite computer review meeting.

- B. No payment requisitions will be processed until the Contractor has a Final Approved Baseline CPM Construction Schedule.
  - 1. Where in the periodic computer update process is processed more frequent than monthly, the mid month updates shall be termed “Interim Project Review”.
  - 2. End of Month periodic computer reviews for payment purposes shall be termed “Payment Requisition Project Review”.
- C. Where these periodic update reviews take place onsite and are processed by the COTR, no further formal submission of any material is required by the Contractor for those updates defined as “Interim Project Review”. The CPM Construction Schedule submittal process for Payment Requisition Project Review shall be the same as for the Final Approved Baseline CPM Construction Schedule submittal. All submittal requirements pertaining to Payment Requisition shall be as directed by the Contracting Officer and the Construction Manager.

#### 2.4 PROJECT TIME EXTENSIONS

- A. Additional Contract time shall be authorized by the Contracting Officer only for reasons authorized under this contract. Any such request for additional contract time must include documentation justifying the requested additional contract time as well as supporting computer documentation.
- B. The supporting computer documentation necessary for any request for additional contract time shall contain the following information:
  - 1. Weather Delays:
    - a. All time extension requests based upon adverse weather must demonstrate that the degree of adverse weather upon which the request is based has exceeded the NOAA 10 year weather average as measured at the closest local official NOAA weather station.
    - b. Adverse weather is defined as any weather exceeding NOAA 10 years average.
    - c. The Contract duration can only be extended when the Contractor can demonstrate that the computer generated projected completion date exceeds the project's current contract completion date.
    - d. To demonstrate that the projected completion date exceeds the project's current contract completion date, the Contractor shall produce a comparison of two computer generated reports with the data date of each being the most recent update prior to the weather event in question.
      - 1) The first report is to be a copy of the historically updated computer generated schedule which is to serve as the pre impact baseline schedule.
      - 2) The second report is to contain additional activities and logic to accurately define the weather impact upon the appropriate impacted activity(s). This weather impact must be based upon that weather which is in excess of its 10 year average.
    - e. The difference between the first reports's predicted project completion date and the second report's predicted project completion date will be the maximum amount of time allowed for the extension of the current Contract Completion Date.



- f. If the predicted completion date of the first report shows the project to be ahead of schedule, the amount of additional time for this extension will be measured as the difference between the current Contract Completion Date and the computer generated predicted completion date of the second report.
2. Weather Offset may serve as the basis for a weather impact time extension where in the Contractor has proven that the Weather Offset occurred due to a contractually granted time extension. In this case, the analysis process is to be the same as identified above with the only difference being that the degree of adverse weather will be the difference between the official NOAA “normal” weather for the time period in question prior to the basis for the Contractually granted time extension and the NOAA “actual” weather for the delayed time period following the Contractually granted time extension.
3. Non Weather Delays must be analyzed using the same procedure outlined above

## 2.5 FIELD CONDITION REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
  1. List of subcontractors at Project site.
  2. List of separate contractors at Project site.
  3. Approximate count of personnel at Project site.
  4. Equipment at Project site.
  5. Material deliveries.
  6. High and low temperatures and general weather conditions, including presence of rain or snow.
  7. Accidents.
  8. Meetings and significant decisions.
  9. Unusual events (see special reports).
  10. Stoppages, delays, shortages, and losses.
  11. Meter readings and similar recordings.
  12. Emergency procedures.
  13. Orders and requests of authorities having jurisdiction.
  14. Change Orders received and implemented.
  15. Construction Change Directives received and implemented.
  16. Services connected and disconnected.
  17. Substantial Completions authorized.
- B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:
  1. Material stored prior to previous report and remaining in storage.
  2. Material stored prior to previous report and since removed from storage and installed.
  3. Material stored following previous report and remaining in storage.
- C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 3200

## SECTION 01 3233 - PHOTOGRAPHIC DOCUMENTATION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
  - 1. Preconstruction photographs.
  - 2. Periodic construction photographs.
  - 3. Final completion construction photographs.
- B. Related Requirements:
  - 1. Section 01 7700 "Closeout Procedures" for submitting photographic documentation as project record documents at Project closeout.
  - 2. Section 01 7900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For photographer.
- B. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
- C. Digital Photographs: Submit image files within three days of taking photographs.
  - 1. Digital Camera: Minimum sensor resolution of 8 megapixels.
  - 2. Format Minimum 3200 by 2400 pixels, in unaltered original files, with same aspect ratio as the sensor, uncropped, date- and time stamped, in folder named by date of photograph, accompanied by key plan file.
  - 3. Identification: Provide the following information with each image description in file metadata tag:
    - a. Name of Project.
    - b. Name and contact information for photographer.
    - c. Name of Architect and Construction Manager.
    - d. Name of Contractor.
    - e. Date photograph was taken.
    - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
    - g. Unique sequential identifier keyed to accompanying key plan.

#### 1.4 QUALITY ASSURANCE

- A. Photographer Qualifications: An individual who has been regularly engaged as a professional photographer of construction projects for not less than three years.

#### 1.5 COORDINATION

- A. Auxiliary Services: Cooperate with photographer and provide auxiliary services requested, including access to Project site and use of temporary facilities, including temporary lighting required to produce clear, well-lit photographs.

#### 1.6 USAGE RIGHTS

- A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

### PART 2 - PRODUCTS

#### 2.1 PHOTOGRAPHIC MEDIA

- A. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of 8 megapixels, and at an image resolution of not less than 1600 by 1200 and 400 dpi.

### PART 3 - EXECUTION

#### 3.1 CONSTRUCTION PHOTOGRAPHS

- A. Photographer: Engage a qualified photographer to take construction photographs.
- B. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
  - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- C. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
  - 1. Date and Time: Include date and time in file name for each image.
  - 2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Construction Manager.
- D. Preconstruction Photographs: Before starting construction, take photographs of interior construction limit site and interior adjacent areas, including existing items to remain during construction, from different viewpoints points, as directed by Construction Manager.
  - 1. Take not less than 20 photographs to show interior existing conditions adjacent to the construction limit site, in sufficient detail to record accurately the physical conditions at the start of construction

- E. Periodic Construction Photographs: Take 20 photographs monthly, coinciding with the cutoff date associated with each Application for Payment. Select viewpoints to show status of construction and progress since last photographs were taken.
- F. Final Completion Construction Photographs: Take 20 color photographs after date of Substantial Completion for submission as project record documents. Construction Manager will inform photographer of desired vantage points. Include date pictures are taken

END OF SECTION 01 3233

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## SECTION 01 3300 - SUBMITTAL PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Requirements :
  - 1. Section 01 2900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
  - 2. Section 01 3200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
  - 3. Section 01 7823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
  - 4. Section 01 7839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
  - 5. Section 01 7900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

#### 1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as action submittals.
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as informational submittals.
- C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.
- D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

#### 1.4 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making

corrections or modifications to submittals noted by the Architect and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal: Submit concurrently with start-up construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
  - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
  - a. Scheduled date for first submittal.
  - b. Specification Section number and title.
  - c. Submittal category: Action, informational.
  - d. Name of subcontractor.
  - e. Description of the Work covered.
  - f. Scheduled date for Architect's and Construction Manager's final release or approval.
  - g. Scheduled dates for purchasing.
  - h. Scheduled dates for installation.
  - i. Activity or event number.

#### 1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic copies of CAD Drawings of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.
  1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings.
    - a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
    - b. Contractor shall execute a **Digital Data Licensing Agreement** on the IBI Group of Virginia, Inc. form as attached in this Section.
    - c. The following digital data files will be furnished for each appropriate discipline:
      - 1) Floor plans.
      - 2) Reflected ceiling plans.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Submittals must be submitted to the Architect, via the Construction Manager, and reviewed prior to the start of Work. Work that proceeds without submittals reviewed by Architect is at the sole risk of the Contractor. No payment applications will be processed for Work that was conducted without submittals.
  1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.



3. Submit action submittals and informational submittals required by each Specification Section as separate packages under separate transmittals with separate control numbers.
  4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
    - a. Architect reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 10 working days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
  2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
  3. Resubmittal Review: Allow 10 working days for review of each resubmittal.
  4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 20 working days for initial review of each submittal.
  5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Construction Manager, through Architect, before being returned to Contractor.
- D. Identification and Information: Place a permanent label or title block on each paper copy submittal item for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
  2. Provide a space approximately 6 by 8-inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect and Architect's Consultants.
  3. Include the following information for processing and recording action taken:
    - a. Project name.
    - b. Date.
    - c. Name of Architect.
    - d. Name of Construction Manager.
    - e. Name of Contractor.
    - f. Name of subcontractor.
    - g. Name of supplier.
    - h. Name of manufacturer.
    - i. Sequential submittal number or other unique identifier, including revision identifier.
    - j. Drawing number, detail references, and specification section number, as appropriate.
    - k. Location(s) where product is to be installed, as appropriate.
    - l. Other necessary identification.
- E. Identification and Information: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file with links enabling navigation to each item.
  2. Name file with submittal number or other unique identifier, including revision identifier.
  3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
  4. Include the following information on an inserted cover sheet:
    - a. Project name.
    - b. Date.
    - c. Name and address of Architect.
    - d. Name of Construction Manager.
    - e. Name of Contractor.
    - f. Name of firm or entity that prepared submittal.
    - g. Name of subcontractor.
    - h. Name of supplier.
    - i. Name of manufacturer.
    - j. Drawing number and detail references, as appropriate.
    - k. Location(s) where product is to be installed, as appropriate.
    - l. Related physical samples submitted directly.
    - m. Other necessary identification.
  5. Include the following information as keywords in the electronic file metadata:
    - a. Project name.
    - b. Manufacturer name.
    - c. Product name.
    - d. Specification section number reference.
- F. Options: Identify options requiring selection by the Architect.
- G. Deviations: Identify deviations from the Contract Documents on submittals. Deviations after submittals reviewed by Architect shall be resubmitted for further Architect review for compliance with Contract Documents and design intent.
- H. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect or Construction Manager observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect and Construction Manager.
- I. Transmittal: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal or resubmittal using a transmittal form. Architect and Construction Manager will return submittals, without review, received from sources other than Contractor.
1. Transmittal Form: Use form acceptable to Owner.
  2. Transmittal Form: Provide locations on form for the following information:
    - a. Project name.
    - b. Date.
    - c. Destination (To:).
    - d. Source (From:).
    - e. Names of subcontractor, manufacturer, and supplier.
    - f. Category and type of submittal.

- g. Submittal purpose and description.
  - h. Indication of full or partial submittal.
  - i. Drawing number and detail references, as appropriate.
  - j. Transmittal number, numbered consecutively.
  - k. Submittal and transmittal distribution record.
  - l. Specification Number and Title.
  - m. Remarks.
  - n. Signature of transmitter.
3. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- J. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
- 1. Note date and content of previous submittal.
  - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
  - 3. Resubmit submittals until they are marked with NO EXCEPTION TAKEN notation from Architect's action stamp.
- K. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- L. Use for Construction: Use only final submittals that are marked with NO EXCEPTION TAKEN notation from Architect's action stamp.

## PART 2 - PRODUCTS

### 2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by "Submittal Schedule". Types of submittals required are indicated in individual Specification Sections.
- 1. Action Submittals: Submit three (3) paper copies of each submittal, unless otherwise indicated. Architect, through Construction Manager, will return two copies.
  - 2. Informational Submittals: Submit two paper copies of each submittal, unless otherwise indicated. Architect and Construction Manager will not return copies.
  - 3. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."
  - 4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
    - a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
    - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

5. Test and Inspection Reports Submittals: Comply with requirements specified in Section 014000 "Quality Requirements." Currently not included in this specification.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data is not suitable for use, submit as Shop Drawings, not as Product Data.
  2. Mark each copy of each submittal to show which products and options are applicable.
  3. Include the following information, as applicable:
    - a. Manufacturer's catalog cuts.
    - b. Manufacturer's product specifications.
    - c. Standard color charts.
    - d. Statement of compliance with specified referenced standards.
    - e. Testing by recognized testing agency.
    - f. Application of testing agency labels and seals.
    - g. Notation of coordination requirements.
    - h. Availability and delivery time information.
  4. For equipment, include the following in addition to the above, as applicable:
    - a. Wiring diagrams showing factory-installed wiring.
    - b. Printed performance curves.
    - c. Operational range diagrams.
    - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
  5. Submit Product Data before or concurrent with Samples.
  6. Submit Product Data in the following format:
    - a. Three (3) paper copies of Product Data, unless otherwise indicated. Architect will return two copies through Construction Manager.
    - b. PDF electronic file, upon request.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    - a. Identification of products.
    - b. Schedules.
    - c. Compliance with specified standards.
    - d. Notation of coordination requirements.
    - e. Notation of dimensions established by field measurement.
    - f. Relationship and attachment to adjoining construction clearly indicated.
    - g. Seal and signature of professional engineer if specified.
  2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11-inches but no larger than 30 by 42-inches.
  3. Submit Shop Drawings in the following format:

- a. Three (3) opaque (bond) copies of each submittal. Architect will return red mark original and copies to Construction Manager.
  - b. PDF electronic file, upon request.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
  2. Identification: Attach label on unexposed side of Samples that includes the following:
    - a. Generic description of Sample.
    - b. Product name and name of manufacturer.
    - c. Sample source.
    - d. Number and title of applicable Specification Section.
  3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    - a. Samples not incorporated into the Work, are the property of Owner.
  4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
    - a. Number of Samples: Submit four full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect, through Construction Manager, will return one submittal with options selected.
  5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
    - a. Number of Samples: Submit two sets of Samples, unless otherwise indicated in specification section. Architect will retain one Sample set; remainder will be returned.
      - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
      - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least four sets of paired units that show approximate limits of variations.
- E. Product Schedule: Prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product indicated in the Contract Documents.
  2. Manufacturer and product name, and model number if applicable.
  3. Number and name of room or space.
  4. Location within room or space.
  5. Submit product schedule in the following format:
    - a. Three (3) paper copies of product schedule or list, unless otherwise indicated. Architect, through Construction Manager, will return two copies.
    - b. PDF electronic file, upon request.
- F. Contractor's Construction Schedule: Comply with requirements specified in Section 01 3200 "Construction Progress Documentation."
- G. Application for Payment: Comply with requirements specified in Section 01 2900 "Payment Procedures."
- H. Schedule of Values: Comply with requirements specified in Section 01 2900 "Payment Procedures."
- I. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
1. Name, address, and telephone number of entity performing subcontract or supplying products.
  2. Number and title of related Specification Section(s) covered by subcontract.
  3. Drawing number and detail references, as appropriate, covered by subcontract.
  4. Submit subcontract list in the following format:
    - a. Number of Copies: Three paper copies of subcontractor list, unless otherwise indicated. Architect, through Construction Manager, will return two copies.
    - b. PDF electronic file, upon request.
- J. Coordination Drawings: Comply with requirements specified in Section 01 3100 "Project Management and Coordination."
- K. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- L. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on American Welding Society (AWS) forms. Include names of firms and personnel certified.
- M. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- N. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

- O. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- P. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- Q. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- R. Product Test Reports: Submit written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- S. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
  - 1. Name of evaluation organization.
  - 2. Date of evaluation.
  - 3. Time period when report is in effect.
  - 4. Product and manufacturers' names.
  - 5. Description of product.
  - 6. Test procedures and results.
  - 7. Limitations of use.
- T. Schedule of Tests and Inspections: Comply with requirements specified in Section 01 4000 "Quality Requirements."
- U. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- V. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- W. Field Test Reports: Submit reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- X. Maintenance Data: Comply with requirements specified in Section 01 7823 "Operation and Maintenance Data."
- Y. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

## PART 3 - EXECUTION

### 3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect and Construction Manager. Contractors submittals which are not coordinated with other work and do not comply with Contract Documents will be returned without review. Contractor shall submit only materials, products, and assemblies required by Contract Document. Use of other materials, products, and assemblies throughout execution of Work is prohibited, unless it is requested as a substitution request in a timely manner, as specified in Contract Documents.
- B. Project Closeout and Maintenance/Material Submittals: Refer to requirements in Section 017700 "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

### 3.2 ARCHITECT'S ACTION

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it to Construction Manager for immediate return to the Contractor. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:
  - 1. NET - NO EXCEPTIONS TAKEN Conforms to design concept and information given in the Contract Documents - No resubmission necessary
  - 2. CTC - CONFORM TO COMMENTS, RESUBMISSION NOT REQ. Conforms with comments noted. Certain submissions will require as-built drawings by the end of the project. \*Do not resubmit CTC's, unless specifically requested by Architect. Unsolicited resubmissions will not be reviewed.
  - 3. RAR - REVISE & RESUBMIT Does not conform to design concept and information given in the Contract Documents. All noted corrections must be made and revised documents must be resubmitted. Marked – up changes to originals will not be accepted.
  - 4. NA – NO ACTION: Not reviewed for various reasons. Incorrect submission, non-compliance with Contract Document, missing tracking numbers, unauthorized substitutions and informational submittals.
- C. Informational Submittals: Architect and Construction Manager will review each submittal and will not return it, or will return it, if it does not comply with requirements. Architect and Construction Manager will forward each submittal to appropriate party.
- D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect and Construction Manager.
- E. Incomplete submittals are not acceptable, will be considered nonresponsive, and will be returned without review. The Architect will perform up to two reviews of any item as part of these services. Resubmittals that continue to not address the previous submittals comments, do not check for coordination of other Work of the Contract, or were not reviewed for



compliance with the Contract Documents will be returned to the Contractor as revise and resubmit. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of their details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor. The Architect's review of the Contractor's submittals shall not constitute approval of safety precautions or of any means, methods, techniques, sequences, or procedures. The Owner reserves the right to backcharge the Contractor for - submittal reviews in excess of two reviews

- F. Submittals not required by the Contract Documents will not be reviewed and will be discarded.

### 3.3 ATTACHMENT

- A. Digital Data Licensing Agreement at end of section

END OF SECTION 01 3300













SECT NO.	SECTION TITLE	SUBMITTALS							
		COORD W/ CONTRA CT.	COORD DWGS	SHOP DWGS, RECO RD DWGS	SAMPLE	PROD UCT DATA/ CAT CUTS	TEST REPORTS/ MANUFACTURE R'S CERTIFICATION	MAINTENANCE DATA	WARRA NTY
26 2726	Wiring Devices								
26 5100	Interior Lighting								
27 0101	Communications Gen- eral Provisions								
27 0500	Common Work Results for Communications								
27 1500	Voice and Data Com- munications Cabling								
28 0101	Electronic Safety and Security General Provi- sions								
28 0500	Common Work Results for Electronic Safety and Security								
28 3100	Fire Detection and Alarm Systems								

END OF SECTION 01 3300





**IBI GROUP**

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Alexandria VA 22314 USA

tel 703 836 9600

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## DIGITAL DATA LICENSING AGREEMENT

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IBI Project No.: 2153. 05

Date:

Project Name: District of Columbia Courts, Interior Improvements For  
Interim Security Office and Wellness Center

From (Architect): \_\_\_\_\_

To: \_\_\_\_\_  
(General Contractor Name)

Cc: \_\_\_\_\_

RE: \_\_\_\_\_

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### Terms and Conditions

#### I. Ownership

- A. All electronic documentation produced by IBI Group (hereinafter referred to as Architect) and the copyright in them, is and shall remain the property of Architect. Architect provides Electronic Documents as a convenience to The General Contractor Company. (hereinafter referred to as GC), with no implication or change regarding the Contract relationships already established on the project. Furthermore, Architect provides no warranty or guarantee, express, implied, or otherwise, regarding the accuracy or the usefulness of the information provided in the Electronic Documents. Architect shall not be responsible for media defects on which the Electronic Documents are delivered. Architect does not warrant that the Electronic Documents shall be free of defects when the contractor used the enclosed Electronic Documents.
- B. The providing of the CAD disks, Electronic Documents and any and all other electronic media by Architect to GC is solely for the convenience of GC. Furthermore, by providing these items to GC, Architect does not in any way waive any of its ownership rights in these items.

#### II. Limited Purpose Use

- A. Architect hereby authorizes GC to use Architect's Electronic Documents solely for information and reference in connection with the preparing of backgrounds for the submittals required for their continuing work on the above referenced project. GC therefore recognizes and agrees that the Electronic Documents are not the Contract Documents and that differences might exist between them and the hard-copy Contract Documents issued to date.
- B. The Electronic Documents shall not be used by GC or, others on other projects, for additions to this Project or for completion of this project by others. Such license shall not be transferable except with Architect's written consent and with appropriate compensation to Architect. Submission or distribution of the Electronic Documents to meet official regulatory requirements or for other purposes in connection with the Project shall not be construed as publication in derogation of Architect's rights.
- C. GC represents, and hereby guarantees, that is has a current, valid licenses for the use of CAD disks, Electronic Documents, and any and all other electronic media provided by Architect to GC pertaining to this project.



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- D. GC shall return all CAD disks, Electronic Documents, and any and all other electronic media provided by Architect pertaining to this Project promptly upon the completion of the Project, or at the request, and at the sole discretion of Architect. GC shall also provide Architect with all additional disks, diskettes, or any other electronic media indicating any and all changes, revisions, additions, deletions, or alterations made to any information contained in all CAD disks, Electronic Documents, and any and all other electronic media provided by Architect to GC. GC further agrees that it shall not retain any of the originals, or copies, of the CAD disks, Electronic Documents, and any and all other electronic media provided by Architect to GC pertaining to this project. GC may retain an electronic version of the related "AS BUILT" drawings pertaining to work designed or completed by GC.

**III. Indemnification**

- A. GC agrees to indemnify, hold harmless, and defend Architect and its consultants against all claims, damages, losses and expenses, including attorney's fees arising out of or resulting from the use by GC of Electronic Documents, including modification outside the control of Architect. Any unauthorized use or reuse by GC or others, without written authorization from Architect for the specific purposes intended shall be considered the Contractor's infringement on Architect's copyrights and shall hold no liability or legal exposure to Architect.
- B. GC agrees to indemnify, hold harmless, and defend Architect and its consultants from liability for any unauthorized, improper or illegal use of the CAD disks, Electronic Documents, and any and all other electronic media provided by Architect to GC pertaining to this Project. GC further agrees to indemnify, hold harmless, and defend Architect from any unauthorized, improper, or illegal dissemination or distribution by GC of the CAD disks, Electronic Documents, and any and all other electronic media provided by Architect to GC pertaining to this Project.

**IV. Extent**

- A. These Terms and Conditions are hereby accepted by GC as of the date indicated below, including acknowledgement of the limited purpose for which the files may be used. These Terms and Conditions may be amended only by written instrument signed by both GC and Architect.

\_\_\_\_\_  
*IBI Group*  
*(Architect)*

\_\_\_\_\_  
*(General Contractor)*

\_\_\_\_\_  
*Signature*

\_\_\_\_\_  
*Signature*

\_\_\_\_\_  
*Name (Printed)*

\_\_\_\_\_  
*Name (Printed)*

\_\_\_\_\_  
*Date*

\_\_\_\_\_  
*Date*

## SECTION 01 4000 - QUALITY REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
  - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
  - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
  - 3. Requirements for Contractor to provide quality-assurance and -control services required by Owner, Construction Manager, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Requirements :
  - 1. Section 01 3200 "Construction Progress Documentation" for developing a schedule of required tests and inspections.

#### 1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and to substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Owner or Construction Manager.
- C. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- D. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

- E. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
  - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade or trades.
- F. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

#### 1.4 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Owner for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Owner for a decision before proceeding.

#### 1.5 ACTION SUBMITTALS

- A. Shop Drawings: For mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
  - 1. Indicate manufacturer and model number of individual components.
  - 2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Contractor's Quality-Control Manager Qualifications: For supervisory personnel.
- C. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- D. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
  - 1. Drawing specification reference.
  - 2. Entity responsible for performing tests and inspections.
  - 3. Description of test and inspection.
  - 4. Identification of applicable standards.
  - 5. Identification of test and inspection methods.
  - 6. Number of tests and inspections required.

7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

#### 1.7 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Owner. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
  1. Project Superintendent may also serve as project quality-control manager.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: Include in quality-control plan a comprehensive schedule of Work requiring testing or inspection, including the following:
  1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
  2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
  3. Owner-performed tests and inspections indicated in the Contract Documents, including tests and inspections indicated to be performed by the Commissioning Authority.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Owner has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

#### 1.8 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports. Include the following:
  1. Date of issue.
  2. Project title and number.
  3. Name, address, and telephone number of testing agency.
  4. Dates and locations of samples and tests or inspections.
  5. Names of individuals making tests and inspections.

6. Description of the Work and test and inspection method.
  7. Identification of product by code indicated on drawings.
  8. Complete test or inspection data.
  9. Test and inspection results and an interpretation of test results.
  10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
  11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
  12. Name and signature of laboratory inspector.
  13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of technical representative making report.
  2. Statement on condition of substrates and their acceptability for installation of product.
  3. Statement that products at Project site comply with requirements.
  4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
  5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  6. Statement whether conditions, products, and installation will affect warranty.
  7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of factory-authorized service representative making report.
  2. Statement that equipment complies with requirements.
  3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  4. Statement whether conditions, products, and installation will affect warranty.
  5. Other required items indicated in individual Specification Sections.
- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.
- 1.9 QUALITY ASSURANCE
- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; for individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

- D. **Installer Qualifications:** A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. **Professional Engineer Qualifications:** A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.
- F. **Specialists:** Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
  - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. **Testing Agency Qualifications:** An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
  - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
  - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. **Manufacturer's Technical Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. **Factory-Authorized Service Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. **Preconstruction Testing:** Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
  - 1. Contractor responsibilities include the following:
    - a. Provide test specimens representative of proposed products and construction.
    - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
    - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
    - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
    - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
    - f. When testing is complete, remove test specimens, assemblies, mockups; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Owner, through Construction Manager, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

#### 1.10 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
  1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
  2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
  3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
  1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
  2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
    - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
  3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
  4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
  5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
  6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."
- D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.



- F. Testing Agency Responsibilities: Cooperate with Owner, Construction Manager, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Owner, Construction Manager, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
  2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
  3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
  4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
  5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
  6. Do not perform any duties of Contractor.
- G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
  2. Incidental labor and facilities necessary to facilitate tests and inspections.
  3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
  4. Facilities for storage and field curing of test samples.
  5. Delivery of samples to testing agencies.
  6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
  7. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of the Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses. .
1. Distribution: Distribute schedule to Owner, Construction Manager, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

#### 1.11 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Conducted by a qualified testing agency or special inspector as required by authorities having jurisdiction, as indicated on drawings and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
  2. Notifying Owner, Construction Manager, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.

3. Submitting a certified written report of each test, inspection, and similar quality-control service to Owner, through Construction Manager, with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

### 3.1 ACCEPTABLE TESTING AGENCIES

- A. Contractor shall provide a list of firms, acceptable to the Owner, to perform designated tests and inspections.

### 3.2 TEST AND INSPECTION LOG

- A. Prepare a record of tests and inspections. Include the following:
  1. Date test or inspection was conducted.
  2. Description of the Work tested or inspected.
  3. Date test or inspection results were transmitted to Owner.
  4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Owner's and Construction Manager's reference during normal working hours.

### 3.3 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
  1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 7300 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 4000

## SECTION 01 4200 - REFERENCES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated" refers to graphic representations, notes or schedules on the Drawings, or to requirements elsewhere in the Specifications or other Contract Documents. Terms such as "shown", "noted", "scheduled" and "specified" have the same meaning as "indicated" and are used to further help locate the reference, but no limitation on location is intended except as specifically stated.
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Cutting" refers to removal of material by cutting, sawing, drilling, breaking, chipping, grinding, excavating and similar operations.
- J. "Patching" refers to restoration of a surface to its original completed condition by filling, repairing, refinishing, closing and similar operations.
- K. "Installer" is the Contractor or another entity engaged by the Contractor, either directly or indirectly through subcontracting, to perform a particular construction operation at the Project site, including installation, erection, application and similar operations. Installers shall be skilled in the operations they perform. Where indicated, installers shall also be Specialists as defined in the Construction Contract Clauses.

- L. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.
- M. "Existing" defines work that is currently in place at the time of construction contract award, whether it is to be removed, renovated, or left in place.
- N. "New" defines work that is to be provided under this Contract, and applies to any and all demolition, work to be performed on Existing construction, and all-new construction. All Equipment and Material provided for the Project shall be new, except for specified recycled material content.
- O. "Remove" defines items to be detached from Existing construction and legally disposed off-site. The word "demolish" shall have the same meaning.
- P. "Remove and Salvage" defines items to be detached from Existing construction and delivered to Government-designated location(s) ready for re-use.
- Q. "Remove and Reinstall" defines items to be detached from Existing construction, prepared for re-use, and reinstalled where indicated.
- R. "Existing to Remain" defines items of construction that are not to be removed. Such items shall be protected from damage by construction activities throughout the duration of the Contract.
- S. "Work" defines the performance of all obligations imposed upon the Contractor by the Contract. All Work applies to both Existing and New work.
- T. "Maintain" shall mean maintaining the condition of, and/or maintaining in operation, as applicable.

### 1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
- D. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

### 1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the United States."

- B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

1. AABC - Associated Air Balance Council; [www.aabc.com](http://www.aabc.com).
2. AAMA - American Architectural Manufacturers Association; [www.aamanet.org](http://www.aamanet.org).
3. AAPFCO - Association of American Plant Food Control Officials; [www.aapfco.org](http://www.aapfco.org).
4. AASHTO - American Association of State Highway and Transportation Officials; [www.transportation.org](http://www.transportation.org).
5. AATCC - American Association of Textile Chemists and Colorists; [www.aatcc.org](http://www.aatcc.org).
6. ABMA - American Bearing Manufacturers Association; [www.americanbearings.org](http://www.americanbearings.org).
7. ABMA - American Boiler Manufacturers Association; [www.abma.com](http://www.abma.com).
8. ACI - American Concrete Institute; (Formerly: ACI International); [www.abma.com](http://www.abma.com).
9. ACPA - American Concrete Pipe Association; [www.concrete-pipe.org](http://www.concrete-pipe.org).
10. AEIC - Association of Edison Illuminating Companies, Inc. (The); [www.aeic.org](http://www.aeic.org).
11. AF&PA - American Forest & Paper Association; [www.afandpa.org](http://www.afandpa.org).
12. AGA - American Gas Association; [www.aga.org](http://www.aga.org).
13. AHAM - Association of Home Appliance Manufacturers; [www.aham.org](http://www.aham.org).
14. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); [www.ahrinet.org](http://www.ahrinet.org).
15. AI - Asphalt Institute; [www.asphaltinstitute.org](http://www.asphaltinstitute.org).
16. AIA - American Institute of Architects (The); [www.aia.org](http://www.aia.org).
17. AISC - American Institute of Steel Construction; [www.aisc.org](http://www.aisc.org).
18. AISI - American Iron and Steel Institute; [www.steel.org](http://www.steel.org).
19. AITC - American Institute of Timber Construction; [www.aitc-glulam.org](http://www.aitc-glulam.org).
20. AMCA - Air Movement and Control Association International, Inc.; [www.amca.org](http://www.amca.org).
21. ANSI - American National Standards Institute; [www.ansi.org](http://www.ansi.org).
22. AOSA - Association of Official Seed Analysts, Inc.; [www.aosaseed.com](http://www.aosaseed.com).
23. APA - APA - The Engineered Wood Association; [www.apawood.org](http://www.apawood.org).
24. APA - Architectural Precast Association; [www.archprecast.org](http://www.archprecast.org).
25. API - American Petroleum Institute; [www.api.org](http://www.api.org).
26. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
27. ARI - American Refrigeration Institute; (See AHRI).
28. ARMA - Asphalt Roofing Manufacturers Association; [www.asphaltroofing.org](http://www.asphaltroofing.org).
29. ASCE - American Society of Civil Engineers; [www.asce.org](http://www.asce.org).
30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
31. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; [www.ashrae.org](http://www.ashrae.org).
32. ASME - ASME International; (American Society of Mechanical Engineers); [www.asme.org](http://www.asme.org).
33. ASSE - American Society of Safety Engineers (The); [www.asse.org](http://www.asse.org).
34. ASSE - American Society of Sanitary Engineering; [www.asse-plumbing.org](http://www.asse-plumbing.org).
35. ASTM - ASTM International; [www.astm.org](http://www.astm.org).
36. ATIS - Alliance for Telecommunications Industry Solutions; [www.atis.org](http://www.atis.org).
37. AWEA - American Wind Energy Association; [www.awea.org](http://www.awea.org).
38. AWI - Architectural Woodwork Institute; [www.awinet.org](http://www.awinet.org).
39. AWMAC - Architectural Woodwork Manufacturers Association of Canada; [www.awmac.com](http://www.awmac.com).
40. AWPA - American Wood Protection Association; [www.awpa.com](http://www.awpa.com).
41. AWS - American Welding Society; [www.aws.org](http://www.aws.org).
42. AWWA - American Water Works Association; [www.awwa.org](http://www.awwa.org).
43. BHMA - Builders Hardware Manufacturers Association; [www.buildershardware.com](http://www.buildershardware.com).
44. BIA - Brick Industry Association (The); [www.gobrick.com](http://www.gobrick.com).
45. BICSI - BICSI, Inc.; [www.bicsi.org](http://www.bicsi.org).
46. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); [www.bifma.org](http://www.bifma.org).
47. BISSC - Baking Industry Sanitation Standards Committee; [www.bissc.org](http://www.bissc.org).

48. BWF - Badminton World Federation; (Formerly: International Badminton Federation); [www.bissc.org](http://www.bissc.org).
49. CDA - Copper Development Association; [www.copper.org](http://www.copper.org).
50. CEA - Canadian Electricity Association; [www.electricity.ca](http://www.electricity.ca).
51. CEA - Consumer Electronics Association; [www.ce.org](http://www.ce.org).
52. CFFA - Chemical Fabrics and Film Association, Inc.; [www.chemicalfabricsandfilm.com](http://www.chemicalfabricsandfilm.com).
53. CFSEI - Cold-Formed Steel Engineers Institute; [www.cfsei.org](http://www.cfsei.org).
54. CGA - Compressed Gas Association; [www.cganet.com](http://www.cganet.com).
55. CIMA - Cellulose Insulation Manufacturers Association; [www.cellulose.org](http://www.cellulose.org).
56. CISCA - Ceilings & Interior Systems Construction Association; [www.cisca.org](http://www.cisca.org).
57. CISPI - Cast Iron Soil Pipe Institute; [www.cispi.org](http://www.cispi.org).
58. CLFMI - Chain Link Fence Manufacturers Institute; [www.chainlinkinfo.org](http://www.chainlinkinfo.org).
59. CPA - Composite Panel Association; [www.pbmdf.com](http://www.pbmdf.com).
60. CRI - Carpet and Rug Institute (The); [www.carpet-rug.org](http://www.carpet-rug.org).
61. CRRC - Cool Roof Rating Council; [www.coolroofs.org](http://www.coolroofs.org).
62. CRSI - Concrete Reinforcing Steel Institute; [www.crsi.org](http://www.crsi.org).
63. CSA - Canadian Standards Association; [www.csa.ca](http://www.csa.ca).
64. CSA - CSA International; (Formerly: IAS - International Approval Services); [www.csa-international.org](http://www.csa-international.org).
65. CSI - Construction Specifications Institute (The); [www.csinet.org](http://www.csinet.org).
66. CSSB - Cedar Shake & Shingle Bureau; [www.cedarbureau.org](http://www.cedarbureau.org).
67. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); [www.cti.org](http://www.cti.org).
68. CWC - Composite Wood Council; (See CPA).
69. DASMA - Door and Access Systems Manufacturers Association; [www.dasma.com](http://www.dasma.com).
70. DHI - Door and Hardware Institute; [www.dhi.org](http://www.dhi.org).
71. ECA - Electronic Components Association; (See ECIA).
72. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
73. ECIA - Electronic Components Industry Association; [www.eciaonline.org](http://www.eciaonline.org).
74. EIA - Electronic Industries Alliance; (See TIA).
75. EIMA - EIFS Industry Members Association; [www.eima.com](http://www.eima.com).
76. EJMA - Expansion Joint Manufacturers Association, Inc.; [www.ejma.org](http://www.ejma.org).
77. ESD - ESD Association; (Electrostatic Discharge Association); [www.esda.org](http://www.esda.org).
78. ESTA - Entertainment Services and Technology Association; (See PLASA).
79. EVO - Efficiency Valuation Organization; [www.evo-world.org](http://www.evo-world.org).
80. FCI - Fluid Controls Institute; [www.fluidcontrolsintstitute.org](http://www.fluidcontrolsintstitute.org).
81. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); [www.fiba.com](http://www.fiba.com).
82. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); [www.fivb.org](http://www.fivb.org).
83. FM Approvals - FM Approvals LLC; [www.fmglobal.com](http://www.fmglobal.com).
84. FM Global - FM Global; (Formerly: FMG - FM Global); [www.fmglobal.com](http://www.fmglobal.com).
85. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; [www.floridarooft.com](http://www.floridarooft.com).
86. FSA - Fluid Sealing Association; [www.fluidsealing.com](http://www.fluidsealing.com).
87. FSC - Forest Stewardship Council U.S.; [www.fscus.org](http://www.fscus.org).
88. GA - Gypsum Association; [www.gypsum.org](http://www.gypsum.org).
89. GANA - Glass Association of North America; [www.glasswebsite.com](http://www.glasswebsite.com).
90. GS - Green Seal; [www.greenseal.org](http://www.greenseal.org).
91. HI - Hydraulic Institute; [www.pumps.org](http://www.pumps.org).
92. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
93. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
94. HPVA - Hardwood Plywood & Veneer Association; [www.hpva.org](http://www.hpva.org).
95. HPW - H. P. White Laboratory, Inc.; [www.hpwhite.com](http://www.hpwhite.com).
96. IAPSC - International Association of Professional Security Consultants; [www.iapsc.org](http://www.iapsc.org).
97. IAS - International Accreditation Service; [www.iasonline.org](http://www.iasonline.org).

98. IAS - International Approval Services; (See CSA).
99. ICBO - International Conference of Building Officials; (See ICC).
100. ICC - International Code Council; [www.iccsafe.org](http://www.iccsafe.org).
101. ICEA - Insulated Cable Engineers Association, Inc.; [www.icea.net](http://www.icea.net).
102. ICPA - International Cast Polymer Alliance; [www.icpa-hq.org](http://www.icpa-hq.org).
103. ICRI - International Concrete Repair Institute, Inc.; [www.icri.org](http://www.icri.org).
104. IEC - International Electrotechnical Commission; [www.iec.ch](http://www.iec.ch).
105. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); [www.ieee.org](http://www.ieee.org).
106. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); [www.ies.org](http://www.ies.org).
107. IESNA - Illuminating Engineering Society of North America; (See IES).
108. IEST - Institute of Environmental Sciences and Technology; [www.iest.org](http://www.iest.org).
109. IGMA - Insulating Glass Manufacturers Alliance; [www.igmaonline.org](http://www.igmaonline.org).
110. IGSHPA - International Ground Source Heat Pump Association; [www.igshpa.okstate.edu](http://www.igshpa.okstate.edu).
111. ILI - Indiana Limestone Institute of America, Inc.; [www.iliai.com](http://www.iliai.com).
112. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); [www.intertek.com](http://www.intertek.com).
113. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); [www.isa.org](http://www.isa.org).
114. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
115. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); [www.isfanow.org](http://www.isfanow.org).
116. ISO - International Organization for Standardization; [www.iso.org](http://www.iso.org).
117. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
118. ITU - International Telecommunication Union; [www.itu.int/home](http://www.itu.int/home).
119. KCMA - Kitchen Cabinet Manufacturers Association; [www.kcma.org](http://www.kcma.org).
120. LMA - Laminating Materials Association; (See CPA).
121. LPI - Lightning Protection Institute; [www.lightning.org](http://www.lightning.org).
122. MBMA - Metal Building Manufacturers Association; [www.mbma.com](http://www.mbma.com).
123. MCA - Metal Construction Association; [www.metalconstruction.org](http://www.metalconstruction.org).
124. MFMA - Maple Flooring Manufacturers Association, Inc.; [www.maplefloor.org](http://www.maplefloor.org).
125. MFMA - Metal Framing Manufacturers Association, Inc.; [www.metalframingmfg.org](http://www.metalframingmfg.org).
126. MHIA - Material Handling Industry of America; [www.mhia.org](http://www.mhia.org).
127. MIA - Marble Institute of America; [www.marble-institute.com](http://www.marble-institute.com).
128. MMPA - Moulding & Millwork Producers Association; [www.wmmpa.com](http://www.wmmpa.com).
129. MPI - Master Painters Institute; [www.paintinfo.com](http://www.paintinfo.com).
130. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; [www.mss-hq.org](http://www.mss-hq.org).
131. NAAMM - National Association of Architectural Metal Manufacturers; [www.naamm.org](http://www.naamm.org).
132. NACE - NACE International; (National Association of Corrosion Engineers International); [www.nace.org](http://www.nace.org).
133. NADCA - National Air Duct Cleaners Association; [www.nadca.com](http://www.nadca.com).
134. NAIMA - North American Insulation Manufacturers Association; [www.naima.org](http://www.naima.org).
135. NBGQA - National Building Granite Quarries Association, Inc.; [www.nbgqa.com](http://www.nbgqa.com).
136. NBI - New Buildings Institute; [www.newbuildings.org](http://www.newbuildings.org).
137. NCAA - National Collegiate Athletic Association (The); [www.ncaa.org](http://www.ncaa.org).
138. NCMA - National Concrete Masonry Association; [www.ncma.org](http://www.ncma.org).
139. NEBB - National Environmental Balancing Bureau; [www.nebb.org](http://www.nebb.org).
140. NECA - National Electrical Contractors Association; [www.necanet.org](http://www.necanet.org).
141. NeLMA - Northeastern Lumber Manufacturers Association; [www.nelma.org](http://www.nelma.org).
142. NEMA - National Electrical Manufacturers Association; [www.nema.org](http://www.nema.org).
143. NETA - InterNational Electrical Testing Association; [www.netaworld.org](http://www.netaworld.org).
144. NFHS - National Federation of State High School Associations; [www.nfhs.org](http://www.nfhs.org).
145. NFPA - National Fire Protection Association; [www.nfpa.org](http://www.nfpa.org).
146. NFPA - NFPA International; (See NFPA).
147. NFRC - National Fenestration Rating Council; [www.nfrc.org](http://www.nfrc.org).



148. NHLA - National Hardwood Lumber Association; [www.nhla.com](http://www.nhla.com).
149. NLGA - National Lumber Grades Authority; [www.nlga.org](http://www.nlga.org).
150. NOFMA - National Oak Flooring Manufacturers Association; (See NWFMA).
151. NOMMA - National Ornamental & Miscellaneous Metals Association; [www.nomma.org](http://www.nomma.org).
152. NRCA - National Roofing Contractors Association; [www.nrca.net](http://www.nrca.net).
153. NRMCA - National Ready Mixed Concrete Association; [www.nrmca.org](http://www.nrmca.org).
154. NSF - NSF International; [www.nsf.org](http://www.nsf.org).
155. NSPE - National Society of Professional Engineers; [www.nspe.org](http://www.nspe.org).
156. NSSGA - National Stone, Sand & Gravel Association; [www.nssga.org](http://www.nssga.org).
157. NTMA - National Terrazzo & Mosaic Association, Inc. (The); [www.ntma.com](http://www.ntma.com).
158. NWFMA - National Wood Flooring Association; [www.nwfa.org](http://www.nwfa.org).
159. PCI - Precast/Prestressed Concrete Institute; [www.pci.org](http://www.pci.org).
160. PDI - Plumbing & Drainage Institute; [www.pdionline.org](http://www.pdionline.org).
161. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); [www.plasa.org](http://www.plasa.org).
162. RCSC - Research Council on Structural Connections; [www.boltcouncil.org](http://www.boltcouncil.org).
163. RFCI - Resilient Floor Covering Institute; [www.rfci.com](http://www.rfci.com).
164. RIS - Redwood Inspection Service; [www.redwoodinspection.com](http://www.redwoodinspection.com).
165. SAE - SAE International; [www.sae.org](http://www.sae.org).
166. SCTE - Society of Cable Telecommunications Engineers; [www.scte.org](http://www.scte.org).
167. SDI - Steel Deck Institute; [www.sdi.org](http://www.sdi.org).
168. SDI - Steel Door Institute; [www.steeldoor.org](http://www.steeldoor.org).
169. SEFA - Scientific Equipment and Furniture Association (The); [www.sefalabs.com](http://www.sefalabs.com).
170. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
171. SIA - Security Industry Association; [www.siaonline.org](http://www.siaonline.org).
172. SJI - Steel Joist Institute; [www.steeljoist.org](http://www.steeljoist.org).
173. SMA - Screen Manufacturers Association; [www.smainfo.org](http://www.smainfo.org).
174. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; [www.smacna.org](http://www.smacna.org).
175. SMPTE - Society of Motion Picture and Television Engineers; [www.smpte.org](http://www.smpte.org).
176. SPFA - Spray Polyurethane Foam Alliance; [www.sprayfoam.org](http://www.sprayfoam.org).
177. SPIB - Southern Pine Inspection Bureau; [www.spib.org](http://www.spib.org).
178. SPRI - Single Ply Roofing Industry; [www.spri.org](http://www.spri.org).
179. SRCC - Solar Rating & Certification Corporation; [www.solar-rating.org](http://www.solar-rating.org).
180. SSINA - Specialty Steel Industry of North America; [www.ssina.com](http://www.ssina.com).
181. SSPC - SSPC: The Society for Protective Coatings; [www.sspc.org](http://www.sspc.org).
182. STI - Steel Tank Institute; [www.steeltank.com](http://www.steeltank.com).
183. SWI - Steel Window Institute; [www.steelwindows.com](http://www.steelwindows.com).
184. SWPA - Submersible Wastewater Pump Association; [www.swpa.org](http://www.swpa.org).
185. TCA - Tilt-Up Concrete Association; [www.tilt-up.org](http://www.tilt-up.org).
186. TCNA - Tile Council of North America, Inc.; [www.tileusa.com](http://www.tileusa.com).
187. TEMA - Tubular Exchanger Manufacturers Association, Inc.; [www.tema.org](http://www.tema.org).
188. TIA - Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); [www.tiaonline.org](http://www.tiaonline.org).
189. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
190. TMS - The Masonry Society; [www.masonrysociety.org](http://www.masonrysociety.org).
191. TPI - Truss Plate Institute; [www.tpinst.org](http://www.tpinst.org).
192. TPI - Turfgrass Producers International; [www.turfgrasssod.org](http://www.turfgrasssod.org).
193. TRI - Tile Roofing Institute; [www.tilerroofing.org](http://www.tilerroofing.org).
194. UL - Underwriters Laboratories Inc.; [www.ul.com](http://www.ul.com).
195. UNI - Uni-Bell PVC Pipe Association; [www.uni-bell.org](http://www.uni-bell.org).
196. USAV - USA Volleyball; [www.usavolleyball.org](http://www.usavolleyball.org).
197. USGBC - U.S. Green Building Council; [www.usgbc.org](http://www.usgbc.org).
198. USITT - United States Institute for Theatre Technology, Inc.; [www.usitt.org](http://www.usitt.org).
199. WASTEC - Waste Equipment Technology Association; [www.wastec.org](http://www.wastec.org).
200. WCLIB - West Coast Lumber Inspection Bureau; [www.wclib.org](http://www.wclib.org).



201. WCMA - Window Covering Manufacturers Association; [www.wcmanet.org](http://www.wcmanet.org).
202. WDMA - Window & Door Manufacturers Association; [www.wdma.com](http://www.wdma.com).
203. WI - Woodwork Institute; [www.wicnet.org](http://www.wicnet.org).
204. WSRCA - Western States Roofing Contractors Association; [www.wsrca.com](http://www.wsrca.com).
205. WWPA - Western Wood Products Association; [www.wwpa.org](http://www.wwpa.org).

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut für Normung e.V.; [www.din.de](http://www.din.de).
2. IAPMO - International Association of Plumbing and Mechanical Officials; [www.iapmo.org](http://www.iapmo.org).
3. ICC - International Code Council; [www.iccsafe.org](http://www.iccsafe.org).
4. ICC-ES - ICC Evaluation Service, LLC; [www.icc-es.org](http://www.icc-es.org).

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; [www.usace.army.mil](http://www.usace.army.mil).
2. CPSC - Consumer Product Safety Commission; [www.cpsc.gov](http://www.cpsc.gov).
3. DOC - Department of Commerce; National Institute of Standards and Technology; [www.nist.gov](http://www.nist.gov).
4. DOD - Department of Defense; [www.quicksearch.dla.mil](http://www.quicksearch.dla.mil).
5. DOE - Department of Energy; [www.energy.gov](http://www.energy.gov).
6. EPA - Environmental Protection Agency; [www.epa.gov](http://www.epa.gov).
7. FAA - Federal Aviation Administration; [www.faa.gov](http://www.faa.gov).
8. FG - Federal Government Publications; [www.gpo.gov](http://www.gpo.gov).
9. GSA - General Services Administration; [www.gsa.gov](http://www.gsa.gov).
10. HUD - Department of Housing and Urban Development; [www.hud.gov](http://www.hud.gov).
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; [www.eetd.lbl.gov](http://www.eetd.lbl.gov).
12. OSHA - Occupational Safety & Health Administration; [www.osha.gov](http://www.osha.gov).
13. SD - Department of State; [www.state.gov](http://www.state.gov).
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; [www.trb.org](http://www.trb.org).
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; [www.ars.usda.gov](http://www.ars.usda.gov).
16. USDA - Department of Agriculture; Rural Utilities Service; [www.usda.gov](http://www.usda.gov).
17. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; [www.ojp.usdoj.gov](http://www.ojp.usdoj.gov).
18. USP - U.S. Pharmacopeial Convention; [www.usp.org](http://www.usp.org).
19. USPS - United States Postal Service; [www.usps.com](http://www.usps.com).

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CFR - Code of Federal Regulations; Available from Government Printing Office; [www.gpo.gov/fdsys](http://www.gpo.gov/fdsys).
2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; [www.quicksearch.dla.mil](http://www.quicksearch.dla.mil).
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).

5. FS - Federal Specification; Available from DLA Document Services; [www.quicksearch.dla.mil](http://www.quicksearch.dla.mil).
    - a. Available from Defense Standardization Program; [www.dsp.dla.mil](http://www.dsp.dla.mil).
    - b. Available from General Services Administration; [www.gsa.gov](http://www.gsa.gov).
    - c. Available from National Institute of Building Sciences/Whole Building Design Guide; [www.wbdg.org/ccb](http://www.wbdg.org/ccb).
  6. MILSPEC - Military Specification and Standards; (See DOD).
  7. USAB - United States Access Board; [www.access-board.gov](http://www.access-board.gov).
  8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).
- F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; [www.bearhfti.ca.gov](http://www.bearhfti.ca.gov).
  2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; [www.calregs.com](http://www.calregs.com).
  3. CDHS; California Department of Health Services; (See CDPH).
  4. CDPH; California Department of Public Health; Indoor Air Quality Program; [www.cal-iaq.org](http://www.cal-iaq.org).
  5. CPUC; California Public Utilities Commission; [www.cpuc.ca.gov](http://www.cpuc.ca.gov).
  6. SCAQMD; South Coast Air Quality Management District; [www.aqmd.gov](http://www.aqmd.gov).
  7. TFS; Texas A&M Forest Service; Sustainable Forestry and Economic Development; [www.txforestservation.tamu.edu](http://www.txforestservation.tamu.edu).

PART 2 - PRODUCTS (Not Used)  
PART 3 - EXECUTION (Not Used)

END OF SECTION 01 4200

## SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

#### 1.3 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall not be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.
- B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Contractor shall provide his own connections and extensions of services as required for construction operations.
- C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Contractor shall provide his own connections and extensions of services as required for construction operations.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary staging areas.
- B. Dust-Control and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust-control and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
  - 1. Locations of dust-control partitions at each phase of the work.
  - 2. HVAC system isolation schematic drawing.
  - 3. Location of proposed air filtration system discharge.
  - 4. Other dust-control measures.
  - 5. Waste management plan.

#### 1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

- C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

## 1.6 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mils (0.25-mm) minimum thickness, with flame-spread rating of 15 or less per ASTM E 84.
- B. Dust Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60-inches (914 by 1624-mm).
- C. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

### 2.2 TEMPORARY FACILITIES

- A. Field Offices, General: There will be no separate area, outside of the limits of construction, for a construction field office and storage.

### 2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
  - 1. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return air grille in system and remove at end of construction and clean HVAC system as required in Division 01 Section "Closeout Procedures".
- C. Air Filtration Units: HEPA primary and secondary filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

### 3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
  - 1. Arrange with Owner and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- C. Sanitary Toilets Facilities: : Use of designated existing toilet facilities closest to construction site will be permitted under condition that Contractor will enter into agreement with M&N [Court Facilities Maintenance (contact phone # 301-384-0215)] for cleaning and maintenance services at the end of each shift on daily bases. At Substantial Completion, restore damaged facilities to condition existing before initial use without cost to DC Courts.
- D. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
  - 1. Prior to commencing work, isolate the HVAC system in area where work is to be performed in accordance with approved coordination drawings.
    - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
    - b. Maintain negative air pressure within work area using HEPA-equipped air filtration units, starting with commencement of temporary partition construction (generally constructed of polyethylene sheeting), and continuing until removal of temporary partitions is complete.
  - 2. The use of fume and odor producing products and materials shall be done in such a manner, or at such a time as to minimize impact on building occupants. Provide measures to minimize tracking of dust through non-construction areas.
- E. Dust and Fume Control Measures: Work performed adjacent to occupied areas shall be done within dust control barriers (generally constructed of polyethylene sheeting). To the extent feasible, maintain the work environment at a negative pressure differential with the adjoining occupied areas. The use of fume and odor producing products and materials shall be done in such a manner, or at such a time as to minimize impact on building occupants. Provide measures to minimize tracking of dust through non-construction areas.
  - 1. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust containment devices.
  - 2. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
- F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on

completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
- G. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
- H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, and inspections.
1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
  2. At Owner designated location post a list of important telephone numbers.
    - a. Police and fire departments.
    - b. Ambulance service.
    - c. Contractor's home office.
    - d. Architect's office.
    - e. Engineers' offices.
    - f. Owner's office.
    - g. Principal subcontractors' field and home offices.
  3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field site/office.

### 3.3 SUPPORT FACILITIES INSTALLATION

- A. Parking: No parking will be available on site. Refer to Section 01 1000 "SUMMARY."
- B. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
1. Identification Signs: Provide Project identification signs.
  2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
    - a. Provide temporary, directional signs for construction personnel and visitors.
  3. Maintain and touchup signs so they are legible at all times.
  4. No advertisement and marketing signage is allowed on the site
- C. Waste Collection and Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations.
1. There is no permanent location for a dumpster. If the Contractor needs to use a dumpster, they must deliver it to the site loading dock at 6:00 PM and then remove the dumpster before the start of the next day.
  2. Collect waste from construction areas daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Handle

dangerous or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner.

- a. The Contractor shall provide sufficient numbers of workmen to remove all materials and rubbish due to cutting, altering, patching and demolition, and at all times keep building and surround areas free from rubbish and dirt caused by the Contractor's and/or his subcontractor's employees. During entire progress of work, rubbish removal shall be made daily and with such care as is deemed necessary and directed by the Owner.

D. Existing Elevator Use: Use of Owner's existing service elevators will be permitted, provided elevators are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.

1. The use of service elevator has to be shared with the operations of the Owner. Contractor shall schedule and coordinate use of the elevator on daily basis with the Owner.
2. Do not load elevators beyond their rated weight capacity.
3. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.
4. Use of passengers' elevators for construction purpose **is not permitted**.

E. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.

### 3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

B. Contractor Responsibility: The Contractor shall take all necessary precautions to prevent injury to the public, building occupants and visitors, and damage to or contamination of property or the environment. For the purposes of this contract, the public or building occupants shall include all persons not employed by the Contractor or subcontractor thereof.

C. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

D. Temporary Construction Barriers, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

1. The work area shall be fenced, barricaded, or otherwise segregated from the public or building occupants to prevent unauthorized entry into the work area.
  2. Temporary construction barriers, partitions which cover a hole in a rated fire wall, or separate the construction from public access and exit corridors shall be erected floor-to-ceiling, wall-to-wall, and shall remain in place for the duration of the contract. The minimum construction standards for these temporary barriers shall be metal studs, anchored top and bottom at a maximum spacing of 16 inches (406 mm) on-center, and covered with a minimum of one layer of 1/2 inch gypsum wallboard.
  3. If a privacy fence is needed, the Contractor must use "Gray Slats [PVC] with a 90% privacy rating. Mock-up is required and must be approved by the Owner; to be installed in a standard chain link fence" [not a temporary chain link fence since the fencing diamond spacing is larger]
  4. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
  5. Insulate partitions to control noise transmission to occupied areas.
  6. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
  7. Protect air-handling equipment.
  8. Provide walk-off mats at each entrance through temporary partition.
- E. Storage: It is prohibited to store, position, or use equipment, tools, materials, scraps, and trash in a manner likely to present a hazard to the public or building occupants by its accidental shifting, ignition, or other hazardous qualities. Storing of combustible or flammable liquids shall be in accordance with the current edition of the National Fire Code for Flammable and Combustible Materials (NFPA 30).
- F. Obstructions: No corridor, aisle, stairway, door, or exit shall be obstructed or used in such a manner as to encroach upon routes of ingress or egress utilized by the public or building occupants, or to present an unsafe or unhealthy condition to the public or building occupants.
- G. Housekeeping: Housekeeping practices shall be in conformance with OSHA 29 CFR 1910.141 and 29 CFR 1926.25, for non-construction and construction contracts respectively.
- H. Protection of the Public and Federal Employees: Work shall not be performed in any area occupied by the public or Federal employees unless specifically permitted by the contract and the Architect and unless adequate steps are taken for the protection of the public and Federal employees.
- I. Alternate Precautions: When the nature of the work prevents isolation of the work area and the public or building occupants may be in or pass through, under or over the work area, alternate precautions such as the posting of signs, the use of signal persons, the erection of barricades or similar protection around particularly hazardous operations shall be approved and used as appropriate.
- J. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- 3.5 FIRE PROTECTION
- A. Fire Extinguishers:
1. The Contractor shall provide a 2-1/2 gallon gas cartridge type, antifreeze, U.L. approved fire extinguisher for each 1,000 square feet of floor area or fraction thereof. Extinguishers shall be placed on the floor as soon as flammable materials are on the site and until walls



- are erected, at which time the extinguishers shall be hung on plywood backboards painted red, strapped to walls with centers six feet above floor. The Contractor shall not place materials or equipment where they will obstruct access to fire extinguishers.
2. The Contractor shall inspect and check each extinguisher at least once a week during the Contract period and shall affix a dated tag certifying adequacy of charge and workability of each extinguisher.
  3. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.
  4. Where exposed electrical and/or telephone equipment occurs, fire extinguishers of dry chemical type for Class B and C fires shall be provided.

- B. Fire Watch: When open flame or spark-producing tools and equipment such as blow torches and welding rods are being used, the Contractor shall provide fire guards to maintain a fire watch over the operation of these items at all times during the use and until all materials have cooled sufficiently to no longer constitute a fire hazard. Provide additional fire guards required by Fire Department as determined by the Local Fire Department inspector after Work is under way.

### 3.6 STORAGE AND USE OF HAZARDOUS, FLAMMABLE OR PRESSURIZED MATERIALS

- A. Hazardous, flammable or pressurized materials shall not be stored in the building, including roof, and shall be removed from the premises at the completion of each day's work.
1. Hazardous, flammable or pressurized materials shall be stored on the site in fire rated containers provided by Contractor.
- B. The handling and storage of all welding materials, acetylene and oxygen tanks, burners and other equipment required for the execution of welding and cutting work shall be subject at all times to the approval of the DC Courts Buildings Manager (facility manager for delegated buildings). All welding materials and gas tanks shall be promptly removed from the premises upon completion of each day's work. Welding and equipment shall conform to the American Welding Society's Code for Welding in Building Construction, latest edition (subject to State and local laws and ordinances).
- C. The Contractor shall provide and supervise the provision of compressed air required for any work.
- D. Vacuum attachments shall be used on saws and drills. Use HEPA filters with this equipment.
- E. Welding, Cutting, and Brazing: DC Courts specifically requires a permit for welding, cutting, and brazing. This permit, GSA Form 1755 - Welding, Cutting and Brazing (available upon request) shall be approved each day by the DC Courts Buildings Manager (facility manager for delegated buildings) whenever welding, cutting or any open flame work is performed.
1. Work areas shall be kept clear of combustibles within a 25-foot (7.62-meter) radius of any open flame work. Combustibles which cannot be removed shall be covered with flame-resistant blankets.
  2. Compressed gas cylinders shall be secured in a vertical position at all times. Valve protection caps shall be in place whenever cylinders are not in use, moved or stored.
  3. Appropriate fire extinguishers shall be maintained at welding and cutting operations.
  4. A designated fire watch shall sign and return the permit. The fire watch shall be on duty during operations and for a sufficient time afterwards to ensure no possibility of fire exists.

5. An exhaust system shall be provided for welding to occur inside the building. Sprinkler heads shall be wrapped before welding can occur. The heads shall be unwrapped at the end of each workday.

F. Compressed Air: The Contractor shall provide, or supervise the provision of, compressed air required for any work.

G. The Contractor shall notify Construction Manager and DC Courts before using materials with an odor that could enter the main buildings through air intake vents. The Contractor shall cover the intake vents and, if necessary, wait for the main building HVAC system to be shut down.

H. Explosive or powder driven fasteners or pins will not be permitted inside the building under any circumstances.

I. Equipment driven by internal combustion engines will not be permitted inside the building under any circumstances.

### 3.7 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor.

2. At Substantial Completion, repair, renovate and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 7700 "Closeout Procedures."

END OF SECTION 01 5000

## SECTION 01 6000 - PRODUCT REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
  - 1. Section 01 2500 "Substitution Procedures" for requests for substitutions.
  - 2. Section 01 4200 "References" for applicable industry standards for products specified.

#### 1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
  - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
  - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
  - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

#### 1.4 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.

2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor through Construction Manager of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
  - a. Form of Approval: As specified in Section 01 3300 "Submittal Procedures."
  - b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01 3300 "Submittal Procedures." Show compliance with requirements.

#### 1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

#### 1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
  1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
  2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
  3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
  4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- C. Storage:
  1. Store products to allow for inspection and measurement of quantity or counting of units.
  2. Store materials in a manner that will not endanger Project structure.
  3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
  4. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
  5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
  6. Protect stored products from damage and liquids from freezing.

## 1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
  2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
  2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
- C. Submittal Time: Comply with requirements in Section 01 7700 "Closeout Procedures."

## PART 2 - PRODUCTS

### 2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
  2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
  3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
  4. Where products are accompanied by the term "as selected," Architect will make selection.
  5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
  6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
- B. Product Selection Procedures:
1. Product: Where indicated by name, a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

2. **Manufacturer/Source:** Where indicated by name, a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
  3. **Products:**
    - a. **Restricted List:** Where names of more than one manufacturer and products are listed, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered, unless otherwise indicated.
    - b. **Nonrestricted List:** Where names of more than one manufacturers and products are listed, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
  4. **Manufacturers:**
    - a. **Restricted List:** Where list of manufacturers' is indicated by name, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered, unless otherwise indicated.
    - b. **Nonrestricted List:** Where list of available manufacturers, is indicated by name, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
  5. **Basis-of-Design Product:** Where name of a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C. **Visual Matching Specification:** Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Division 01 Section "Substitution Procedures" for proposal of product.
- D. **Visual Selection Specification:** Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

## 2.2 COMPARABLE PRODUCTS

- A. **Conditions for Consideration:** Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 6000

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## SECTION 01 7300 - EXECUTION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
  - 1. Construction layout.
  - 2. Installation of the Work.
  - 3. Cutting and patching.
  - 4. Progress cleaning.
  - 5. Starting and adjusting.
  - 6. Protection of installed construction.
  - 7. Correction of the Work.

#### 1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
  - 1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
  - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
  - 3. Products: List products to be used for patching and firms or entities that will perform patching work.
  - 4. Dates: Indicate when cutting and patching will be performed.
  - 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate how long services and systems will be disrupted.

#### 1.5 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Owner of locations and details of cutting and await directions from the Owner before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
  2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that result in increased maintenance or decreased operational life or safety. Operational elements include the following:
    - a. Primary operational systems and equipment.
    - b. Fire separation assemblies.
    - c. Air or smoke barriers.
    - d. Fire-suppression systems.
    - e. Mechanical systems piping and ducts.
    - f. Control systems.
    - g. Communication systems.
    - h. Conveying systems.
    - i. Electrical wiring systems.
    - j. Operating systems of special construction.
  3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended or that result in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
    - a. Water, moisture, or vapor barriers.
    - b. Exterior wall construction.
    - c. Equipment supports.
    - d. Piping, ductwork, vessels, and equipment.
    - e. Noise- and vibration-control elements and systems.
  4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Owner's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- B. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.
- 1.6 WARRANTY
- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
  - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to the Owner for the visual and functional performance of in-place materials.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
  - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
  - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
  - 1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by manufacturer's installation instruction, include the following:
    - a. Description of the Work.
    - b. List of detrimental conditions, including substrates.
    - c. List of unacceptable installation tolerances.
    - d. Recommended corrections.
  - 2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
  - 3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
  - 4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
  - 5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of the Contractor, submit a request for information to Owner according to requirements in Section 01 3100 "Project Management and Coordination."

### 3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings. If discrepancies are discovered, notify Owner and Construction Manager promptly.

### 3.4 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
  - 1. Make vertical work plumb and make horizontal work level.
  - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
  - 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
  - 4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces, unless otherwise indicated on drawings.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produces harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

- G. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Owner.
  2. Allow for building movement, including thermal expansion and contraction.
  3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

### 3.5 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Temporary Support: Provide temporary support of work to be cut.
- C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- D. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements of Section 01 1000 "Summary."
- E. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
- F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
  3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.

4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
  5. Proceed with patching after construction operations requiring cutting are complete.
- G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
  2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
    - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    - b. Restore damaged pipe covering to its original condition.
  3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
  4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
- H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.
- ### 3.6 PROGRESS CLEANING
- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
  2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
  3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
    - a. Utilize containers intended for holding waste materials of type to be stored.
  4. Coordinate progress cleaning for joint-use areas where more than one installer has worked.

- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
  - 1. Remove liquid spills promptly.
  - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Comply with waste disposal requirements in Division 01 Section "Temporary Facilities and Controls."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

### 3.7 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

### 3.8 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

- B. Comply with manufacturer's written instructions for temperature and relative humidity.

### 3.9 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.
  - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01 7300



## SECTION 01 7700 - CLOSEOUT PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
1. Substantial Completion procedures.
  2. Final completion procedures.
  3. Warranties.
  4. Final cleaning.
- B. Related Requirements :
1. Section 01 3233 "Photographic Documentation" for submitting final completion construction photographic documentation.
  2. Section 01 7300 "Execution" for progress cleaning of Project site.
  3. Section 01 7823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
  4. Section 01 7839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
  5. Section 01 7900 "Demonstration and Training" for requirements for instructing Owner's personnel.

#### 1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete with request.
1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
  2. Advise Owner of pending insurance changeover requirements.
  3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  5. Prepare and submit Project Record Documents, operation and maintenance manuals, final completion construction photographic documentation, and similar final record information.
  6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
  7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions. Coordinate with Court's Security Vendor

- to insure activation and proper function between security devices and installed door hardware. Complete startup testing of systems.
8. Submit test/adjust/balance records.
  9. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
  10. Advise Owner of changeover in heat and other utilities.
  11. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
  12. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

- B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Owner and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Construction Manager will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Construction Manager, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

#### 1.4 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 01 2900 "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Construction Manager will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

#### 1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:
  - a. Project name.
  - b. Date.
  - c. Name of Architect and Construction Manager.
  - d. Name of Contractor.
  - e. Page number.
4. Submit list of incomplete items in the following format:
  - a. PDF electronic file.

## 1.6 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
  1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
  2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
  3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
  4. Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide table of contents at beginning of document.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

### PART 3 - EXECUTION

#### 3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
  - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
    - a. Clean Project site, in areas disturbed by construction activities of rubbish, waste material, litter, and other foreign substances.
    - b. Remove tools, construction equipment, machinery, and surplus material from Project site.
    - c. Sweep concrete floors broom clean in unoccupied spaces.
    - d. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
    - e. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
    - f. Remove labels that are not permanent.
    - g. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
      - 1) Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates.
    - h. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
    - i. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
    - j. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
    - k. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
    - l. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter upon inspection.
      - 1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report upon completion of cleaning.

- m. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
- n. Leave Project clean and ready for occupancy.

END OF SECTION 01 7700

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## SECTION 01 7823 - OPERATION AND MAINTENANCE DATA

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
  - 1. Operation and maintenance documentation directory.
  - 2. Emergency manuals.
  - 3. Operation manuals for systems, subsystems, and equipment.
  - 4. Product maintenance manuals.
  - 5. Systems and equipment maintenance manuals.
- B. Related Requirements :
  - 1. Section 01 3300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

#### 1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual specification sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
  - 1. Where applicable, clarify and update reviewed manual content to correspond to modifications and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
  - 1. PDF electronic file. Assemble each manual into a composite electronically-indexed file. Submit on digital media acceptable to Architect.
    - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically-linked operation and maintenance directory.
    - b. Enable inserted reviewer comments on draft submittals.

2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect, through Construction Manager, will return two copies.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.
  1. Correct or modify each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

## PART 2 - PRODUCTS

### 2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Organization: Include a section in the directory for each of the following:
  1. List of documents.
  2. List of systems.
  3. List of equipment.
  4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

### 2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
  1. Title page.
  2. Table of contents.
  3. Manual contents.
- B. Title Page: Include the following information:



1. Subject matter included in manual.
  2. Name and address of Project.
  3. Name and address of Owner.
  4. Date of submittal.
  5. Name and contact information for Contractor.
  6. Name and contact information for Construction Manager.
  7. Name and contact information for Architect.
  8. Name and contact information for Commissioning Agent.
  9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
  10. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
  2. File Names and Bookmarks: Enable bookmarking of individual documents based upon file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel upon opening file.
- F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, post-type binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
    - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name and subject matter of contents. Indicate volume number for multiple-volume sets.
  2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components

of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
  - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
  - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

## 2.3 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
  1. Type of emergency.
  2. Emergency instructions.
  3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
  1. Fire.
  2. Flood.
  3. Gas leak.
  4. Water leak.
  5. Power failure.
  6. Water outage.
  7. System, subsystem, or equipment failure.
  8. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
  1. Instructions on stopping.
  2. Shutdown instructions for each type of emergency.
  3. Operating instructions for conditions outside normal operating limits.
  4. Required sequences for electric or electronic systems.
  5. Special operating instructions and procedures.

## 2.4 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
  1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
  2. Performance and design criteria if Contractor is delegated design responsibility.

3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

## 2.5 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:

1. Product name and model number.

2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

## 2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
  - 1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
  - 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
  - 1. Include procedures to follow and required notifications for warranty claims.

### PART 3 - EXECUTION

#### 3.1 MANUAL PREPARATION

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
  - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
  - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data includes more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
  - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
  - 1. Do not use original project record documents as part of operation and maintenance manuals.
  - 2. Comply with requirements of newly prepared record Drawings in Division 01 Section "Project Record Documents."
  
- G. Comply with Section 01 7700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 7823

## SECTION 01 7839 - PROJECT RECORD DOCUMENTS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
  - 1. Record Drawings.
  - 2. Record Specifications.
  - 3. Record Product Data.
  - 4. Miscellaneous record submittals.
- B. Related Requirements :
  - 1. Section 01 7300 "Execution" for final property survey.
  - 2. Section 01 7700 "Closeout Procedures" for general closeout procedures.
  - 3. Section 01 7823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
  - 4. Divisions 02 through 32 Sections for specific requirements for project record documents of the Work in those Sections.

#### 1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
  - 1. Number of Copies: Submit one set(s) of marked-up record prints.
- B. Record Specifications: Submit one paper copy of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit one paper copy annotated PDF electronic files and directories of each submittal.
  - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- D. Miscellaneous Record Submittals: Refer to other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.
- E. Reports: Submit written report weekly indicating items incorporated in Project record documents concurrent with progress of the Work, including modifications, concealed conditions, field changes, product selections, and other notations incorporated.

## PART 2 - PRODUCTS

### 2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings.
1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
    - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    - b. Accurately record information in an acceptable drawing technique.
    - c. Record data as soon as possible after obtaining it.
    - d. Record and check the markup before enclosing concealed installations.
    - e. Cross-reference record prints to corresponding archive photographic documentation.
  2. Content: Types of items requiring marking include, but are not limited to, the following:
    - a. Dimensional changes to Drawings.
    - b. Revisions to details shown on Drawings.
    - c. Revisions to routing of piping and conduits.
    - d. Revisions to electrical circuitry.
    - e. Actual equipment locations.
    - f. Duct size and routing.
    - g. Locations of concealed internal utilities.
    - h. Changes made by Change Order or Construction Change Directive.
    - i. Changes made following Owner's written orders.
    - j. Details not on the original Contract Drawings.
    - k. Field records for variable and concealed conditions.
    - l. Record information on the Work that is shown only schematically.
  3. Mark the Contract Drawings and Shop Drawings completely and accurately. Utilize personnel proficient at recording graphic information in production of marked-up record prints.
  4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
  5. Mark important additional information that was either shown schematically or omitted from original Drawings.
  6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Owner, Architect, and Construction Manager. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
  2. Format: DWG, version operating in Microsoft Windows operating system.
  3. Format: Annotated PDF electronic file.



4. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
  5. Refer instances of uncertainty to Owner through Construction Manager for resolution.
- C. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Owner determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
  2. Consult Owner and Construction Manager for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.
- D. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
  2. Format: Annotated PDF electronic file.
  3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
  4. Identification: As follows:
    - a. Project name.
    - b. Date.
    - c. Designation "PROJECT RECORD DRAWINGS."
    - d. Name of Architect and Construction Manager.
    - e. Name of Contractor.

## 2.2 RECORD SPECIFICATIONS

- A. Maintain one set of marked-up paper copies of the Specifications.
1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

## 2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
  3. Note related Change Orders, record Specifications, and record Drawings where applicable.

- B. Format: Submit record Product Data as paper copy and scanned PDF electronic file(s) of marked up paper copy of Product Data.
  - 1. Include record Product Data directory organized by specification section number and title, electronically linked to each item of record Product Data.

#### 2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as scanned PDF electronic file(s) of marked up miscellaneous record submittals.
  - 1. Include miscellaneous record submittals directory organized by specification section number and title, electronically linked to each item of miscellaneous record submittals.

### PART 3 - EXECUTION

#### 3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and modifications to project record documents as they occur; do not wait until the end of Project.
- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purpose. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Owner's, Architect's and Construction Manager's reference during normal working hours.

END OF SECTION 01 7839

## SECTION 01 7900 - DEMONSTRATION AND TRAINING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
  - 1. Demonstration of operation of systems, subsystems, and equipment.
  - 2. Training in operation and maintenance of systems, subsystems, and equipment.
  - 3. Demonstration and training video recordings.
- B. Related Requirements :
  - 1. Divisions 02 through 32 Sections for specific requirements for demonstration and training for products in those Sections.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
  - 1. Indicate proposed training modules utilizing manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.
- B. Qualification Data: For instructor.
- C. Attendance Record: For each training module, submit list of participants and length of instruction time.
- D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
  - 1. Identification: On each copy, provide an applied label with the following information:
    - a. Name of Project.
    - b. Name and address of videographer.
    - c. Name of Architect.

- d. Name of Construction Manager.
  - e. Name of Contractor.
  - f. Date of video recording.
2. Transcript: Prepared on 8-1/2-by-11-inch paper, punched and bound in heavy-duty, three-ring, vinyl-covered binders. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding video recording. Include name of Project and date of video recording on each page.
  3. At completion of training, submit complete training manual(s) for Owner's use.

#### 1.5 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 01 4000 "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 01 3100 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
  1. Inspect and discuss locations and other facilities required for instruction.
  2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
  3. Review required content of instruction.

#### 1.6 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

### PART 2 - PRODUCTS

#### 2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each

module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
  - a. System, subsystem, and equipment descriptions.
  - b. Performance and design criteria if Contractor is delegated design responsibility.
  - c. Operating standards.
  - d. Regulatory requirements.
  - e. Equipment function.
  - f. Operating characteristics.
  - g. Limiting conditions.
  - h. Performance curves.
2. Documentation: Review the following items in detail:
  - a. Emergency manuals.
  - b. Operations manuals.
  - c. Maintenance manuals.
  - d. Project record documents.
  - e. Identification systems.
  - f. Warranties and bonds.
  - g. Maintenance service agreements and similar continuing commitments.
3. Emergencies: Include the following, as applicable:
  - a. Instructions on meaning of warnings, trouble indications, and error messages.
  - b. Instructions on stopping.
  - c. Shutdown instructions for each type of emergency.
  - d. Operating instructions for conditions outside of normal operating limits.
  - e. Sequences for electric or electronic systems.
  - f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
  - a. Startup procedures.
  - b. Equipment or system break-in procedures.
  - c. Routine and normal operating instructions.
  - d. Regulation and control procedures.
  - e. Control sequences.
  - f. Safety procedures.
  - g. Instructions on stopping.
  - h. Normal shutdown instructions.
  - i. Operating procedures for emergencies.
  - j. Operating procedures for system, subsystem, or equipment failure.
  - k. Seasonal and weekend operating instructions.
  - l. Required sequences for electric or electronic systems.
  - m. Special operating instructions and procedures.
5. Adjustments: Include the following:
  - a. Alignments.
  - b. Checking adjustments.
  - c. Noise and vibration adjustments.
  - d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:
  - a. Diagnostic instructions.
  - b. Test and inspection procedures.
  
7. Maintenance: Include the following:
  - a. Inspection procedures.
  - b. Types of cleaning agents to be used and methods of cleaning.
  - c. List of cleaning agents and methods of cleaning detrimental to product.
  - d. Procedures for routine cleaning
  - e. Procedures for preventive maintenance.
  - f. Procedures for routine maintenance.
  - g. Instruction on use of special tools.
  
8. Repairs: Include the following:
  - a. Diagnosis instructions.
  - b. Repair instructions.
  - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  - d. Instructions for identifying parts and components.
  - e. Review of spare parts needed for operation and maintenance.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 01 7823 "Operations and Maintenance Data."
- B. Set up instructional equipment at instruction location.

#### 3.2 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
  1. Owner will furnish an instructor to describe Owner's operational philosophy.
  2. Owner will furnish Contractor with names and positions of participants.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
  1. Schedule training with Owner, through Construction Manager, with at least seven days' advance notice.

- D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.
- E. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION 01 7900

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## SECTION 02 4119 - SELECTIVE DEMOLITION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:

- 1. Demolition and removal of selected portions of building or structure.
- 2. Salvage of existing items to be reused or recycled.

- B. Related Requirements:

- 1. Section 01 1000 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
- 2. Section 01 7300 "Execution" for cutting and patching procedures.

#### 1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.
- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

#### 1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.

#### 1.5 PREINSTALLATION MEETINGS

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

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Engineering Survey: Submit engineering survey of condition of building.
- C. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for dust control and for noise control. Indicate proposed locations and construction of barriers.
- D. Schedule of Selective Demolition Activities: Indicate the following:
  1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
  2. Interruption of utility services. Indicate how long utility services will be interrupted.
  3. Coordination for shutoff, capping, and continuation of utility services.
  4. Use of elevator and stairs.
  5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- E. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces that might be misconstrued as damage caused by demolition operations. Comply with Section 01 3233 "Photographic Documentation." Submit before Work begins.
- F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
- G. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

#### 1.7 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.

#### 1.8 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

## 1.9 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
  - 1. Hazardous materials will be removed by Owner before start of the Work.
  - 2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
  - 1. Maintain fire-protection facilities in service during selective demolition operations.

## 1.10 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

- B. Review Project Record Documents of existing construction or other existing condition information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
  - 1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
- D. Survey of Existing Conditions: Record existing conditions by use of measured drawings and preconstruction photographs or video.
  - 1. Comply with requirements specified in Section 01 3233 "Photographic Documentation."
  - 2. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

### 3.2 PREPARATION

- A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

### 3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
  - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
  - 2. Arrange to shut off utilities with utility companies.
  - 3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
  - 4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
    - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

- f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
- g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

### 3.4 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
  - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
  - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
  - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
  - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
  - 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 01 5000 "Temporary Facilities and Controls."
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
  - 1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

### 3.5 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
  - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
  - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
  - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
  - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
  - 5. Maintain fire watch during and for at least 8 hours after flame-cutting operations.
  - 6. Maintain adequate ventilation when using cutting torches.

7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
  8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
  9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
  10. Dispose of demolished items and materials promptly.
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C. Removed and Salvaged Items:
1. Clean salvaged items.
  2. Pack or crate items after cleaning. Identify contents of containers.
  3. Store items in a secure area until delivery to Owner.
  4. Transport items to Owner's storage area designated by Owner.
  5. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
  2. Pack or crate items after cleaning and repairing. Identify contents of containers.
  3. Protect items from damage during transport and storage.
  4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.
- 3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS
- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- C. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings."
- 3.7 DISPOSAL OF DEMOLISHED MATERIALS
- A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.
1. Do not allow demolished materials to accumulate on-site.

2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

### 3.8 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 02 4119

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## SECTION 06 1053 - MISCELLANEOUS ROUGH CARPENTRY

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Wood blocking, and nailers.
  - 2. Utility shelving.
  - 3. Plywood backing panels.

#### 1.3 DEFINITIONS

- A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.
- B. Dimension Lumber: Lumber of 2 inches nominal or greater size but less than 5 inches nominal size in least dimension.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
  - 1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
  - 2. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
  - 3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
  - 1. Fire-retardant-treated wood.
  - 2. Power-driven fasteners.
  - 3. Post-installed anchors.
  - 4. Metal framing anchors.

## 1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

## PART 2 - PRODUCTS

### 2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
  - 1. Factory mark each piece of lumber with grade stamp of grading agency.
- B. Maximum Moisture Content of Lumber: 15 percent unless otherwise indicated.

### 2.2 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
  - 1. Treatment shall not promote corrosion of metal fasteners.
  - 2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 15 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

- E. Application: Treat all miscellaneous carpentry unless otherwise indicated.

## 2.3 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
  - 1. Blocking.
  - 2. Nailers.
  - 3. Cants.
  - 4. Utility shelving.
- B. Utility Shelving: Lumber with 15 percent maximum moisture content of any of the following species and grades:
  - 1. Eastern white pine, Idaho white, lodgepole, ponderosa, or sugar pine; Standard or No. 3 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
  - 2. Mixed southern pine or southern pine No. 2 grade; SPIB.
  - 3. Hem-fir or hem-fir (north), Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
  - 4. Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
- C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- E. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

## 2.4 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, DOC PS 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

## 2.5 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Screws for Fastening to Metal Framing: length as recommended by screw manufacturer for material being fastened.
- D. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

- E. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC58, ICC-ES AC193 or ICC-ES AC308 as appropriate for the substrate.
  - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

## 2.6 METAL FRAMING ANCHORS

- A. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.
  - 1. Use for interior locations unless otherwise indicated.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- B. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.
- C. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- D. Do not splice structural members between supports unless otherwise indicated.
- E. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
  - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- F. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- G. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
  - 2. ICC-ES evaluation report for fastener.
- H. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials.

Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

### 3.2 WOOD BLOCKING AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

END OF SECTION 06 1053

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## 06 4116 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:

- 1. Plastic-laminate-faced architectural cabinets.
- 2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural cabinets that are not concealed within other construction.

- B. Related Requirements:

- 1. Section 06 1053 Miscellaneous Rough Carpentry for wood furring, blocking, shims, and hanging strips required for installing cabinets that are concealed within other construction before cabinet installation.
- 2. Section 12 3623.13 Plastic-Laminate-Clad Countertops.

#### 1.3 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.

#### 1.4 PREINSTALLATION MEETINGS

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

#### 1.5 ACTION SUBMITTALS

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

- 1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

- B. Sustainable Design Submittals:

- 1. Product Data: For adhesives, indicating that product contains no urea formaldehyde.
- 2. Product Data: For composite wood products, indicating that product contains no urea formaldehyde.

- C. Shop Drawings: For plastic-laminate-faced architectural cabinets.
  - 1. Include plans, elevations, sections, and attachment details.
  - 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
  - 3. Show locations and sizes of cutouts and holes for items installed in plastic-laminate architectural cabinets.
  - 4. Apply WI Certified Compliance Program label to Shop Drawings.
  
- D. Samples: For each exposed product and for each color and texture specified, in manufacturer's or fabricator's standard size.
  - 1. Corner Pieces:
    - a. Cabinet-front frame joints between stiles and rails and at exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.
    - b. Miter joints for standing trim.
  
  - 2. Exposed Cabinet Hardware and Accessories: One full-size unit for each type and finish.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and fabricator.
- B. Product Certificates: For each type of product.
- C. Quality Standard Compliance Certificates: WI Certified Compliance Program.
- D. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

#### 1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
  - 1. Shop Certification: WI's Certified Compliance Program licensee.
- B. Installer Qualifications: WI's Certified Compliance Program licensee.
- C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
  - 1. Build mockups of typical architectural cabinets as shown on Drawings.
  - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation



areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

#### 1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet-work is 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. Environmental Limitations: Do not deliver or install cabinets until wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.
- C. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - 1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.
- D. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

### PART 2 - PRODUCTS

#### 2.1 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the "Woodwork Institute Standards" for grades of cabinets indicated for construction, finishes, installation, and other requirements.
  - 1. Provide inspections of fabrication and installation together with labels and certificates from WI certification program indicating that woodwork complies with requirements of grades specified.
  - 2. The Contract Documents contain requirements that are more stringent than the referenced quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.
- B. Grade: Custom.
- C. Type of Construction: Frameless.
- D. Door and Drawer-Front Style: Flush overlay.
- E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by quality standard.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:

- a. Wilsonart –Wilsonart Americas, 2501 Wilsonart Drive, PO Box 6110, Temple, Texas 76503-6110
- b. Product:
  - 1) Satin Stainless, color # 4830K-18 kitchen area cabinet fronts, PL-1.
  - 2) Oiled Soapstone, color # 4882-38, kitchen area cabinet countertops and backsplashes

F. Laminate Cladding for Exposed Surfaces:

1. Horizontal Surfaces: Grade HGS.
2. Vertical Surfaces: Grade VGS.
3. Edges: Grade VGS.
4. Pattern Direction: As indicated.

G. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade VGS.
  - a. Edges of Plastic-Laminate Shelves: PVC edge banding, 0.12 inch thick, matching laminate in color, pattern, and finish.
  - b. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade VGS.
2. Drawer Sides and Backs: Solid-hardwood lumber.
3. Drawer Bottoms: Hardwood plywood.

H. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.

I. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners.

J. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. Match Architect's sample.

## 2.2 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

1. Wood Moisture Content: 5 to 10 percent.

B. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

C. Composite Wood Products: Products shall be made without urea formaldehyde.

1. Medium-Density Fiberboard (MDF): ANSI A208.2.
2. Particleboard: ANSI A208.1, Grade M-2.
3. Softwood Plywood: DOC PS 1, medium-density overlay.

2.3 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Accuride International.
- b. Knape & Vogt Manufacturing Company

B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, self-closing.

C. Wire Pulls: Back mounted, solid metal 5 inches long, 2-1/2 inches deep, and 5/16 inch in diameter.

D. Pocket Door Slides/ Hinges at sink cabinet: KV8092 by Knape & Vogt Manufacturing Company

E. Catches: Magnetic catches, BHMA A156.9, B03141.

F. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.

G. Drawer Slides: BHMA A156.9.

1. Grade 1 and Grade 2: Side mounted and extending under bottom edge of drawer.

- a. Type: Full extension.
- b. Material: Zinc-plated steel with polymer rollers.

2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full extension type; zinc-plated-steel ball-bearing slides.

3. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 2.

4. For drawers more than 3 inches high, but not more than 6 inches high and not more than 24 inches wide, provide Grade 1.

5. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-100.

6. For trash bins not more than 20 inches high and 16 inches wide, provide Grade 1HD-200.

H. Door Locks: BHMA A156.11, E07121.

I. Drawer Locks: BHMA A156.11, E07041.

J. Door and Drawer Silencers: BHMA A156.16, L03011.

K. Grommets for Cable Passage: 2-inch OD, molded-plastic grommets and matching plastic caps with slot for wire passage.

1. Color: Black.

L. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Satin Stainless Steel: BHMA 630.

M. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

## 2.4 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln-dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

C. Adhesives: Do not use adhesives that contain urea formaldehyde.

## 2.5 FABRICATION

A. Fabricate architectural cabinets to dimensions, profiles, and details indicated.

B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Architect seven days in advance of the dates and times architectural cabinet fabrication will be complete.

C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

## PART 3 - EXECUTION

### 3.1 PREPARATION

A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

### 3.2 INSTALLATION

A. Grade: Install cabinets to comply with quality standard grade of item to be installed.

- B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.
- C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.
- D. Install cabinets, level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.
  - 1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
  - 2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
  - 3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with toggle bolts through metal backing or metal framing behind wall finish.

### 3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean cabinets on exposed and semi-exposed surfaces.

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## SECTION 07 8413 - PENETRATION FIRESTOPPING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Penetrations in fire-resistance-rated walls.
  - 2. Penetrations in horizontal assemblies.
  - 3. Penetrations in smoke barriers.

#### 1.3 PREINSTALLATION MEETINGS

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

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
  - 1. Product Data: For sealants, indicating VOC content.
  - 2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.
- C. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.
  - 1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

## 1.6 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

## 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

## 1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

## 1.9 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
  - 1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
  - 2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
    - a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.
      - 1) UL in its "Fire Resistance Directory."



## 2.2 PENETRATION FIRESTOPPING SYSTEMS

- A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. 3M Fire Protection Products.
    - b. Construction Solutions.
    - c. Hilti, Inc.
    - d. Tremco, Inc.
- B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
  2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
  3. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.
- D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg.
1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at and no more than 50-cfm (0.024-cu. m/s) cumulative total for any 100 sq. ft. at both ambient and elevated temperatures.
- E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E 84.
1. Sealant shall have a VOC content of 250 g/L or less.
- F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.
1. Permanent forming/damming/backing materials.
  2. Substrate primers.
  3. Collars.
  4. Steel sleeves.

## 2.3 FILL MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer sleeve lined with an intumescent strip, a flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.
- E. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.
- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
- I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

## 2.4 MIXING

- A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:
  - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
  - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
  - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

### 3.3 INSTALLATION

- A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.
  - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- C. Install fill materials by proven techniques to produce the following results:
  - 1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
  - 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 the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### 3.4 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.
  - 1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.
- B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of

penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

### 3.5 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2174.
- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

### 3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

### 3.7 PENETRATION FIRESTOPPING SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. Penetration Firestopping Systems for Nonmetallic Pipes, Conduit, or Tubing FS-1:
  1. UL-Classified Systems: C-AJ-2001
  2. F-Rating: 2 hours.
  3. T-Rating: Up to 1/2 hours
  4. Type of Fill Materials: As required to achieve rating.
- C. Penetration Firestopping Systems for Electrical Cables FS-2:
  1. UL-Classified Systems: C-AJ-3008

2. F-Rating 2 hours
3. T-Rating: 1/2 hours.
4. Type of Fill Materials: As required to achieve rating.

D. Penetration Firestopping Systems for Cable Trays with Electrical Cables FS-3:

1. UL-Classified Systems: C-AJ-4002
2. F-Ratings 3 hours
3. T-Rating: 2 hours.
4. Type of Fill Materials: As required to achieve rating.

E. Penetration Firestopping for Insulated Pipes FS-4:

1. UL-Classified Systems: C-AJ-5002
2. F-Ratings 2 hours
3. T-Rating: 1 hours.
4. Type of Fill Materials: As required to achieve rating.

F. Penetration Firestopping Systems for Miscellaneous Electrical Penetrants FS-5:

1. UL-Classified Systems: C-AJ-6003.
2. F-Rating: 3 hours
3. T-Ratings ½ hour
4. Type of Fill Materials: As required to achieve rating.

G. Penetration Firestopping Systems for Miscellaneous Mechanical Penetrants FS-6:

1. UL-Classified Systems: C-AJ-7005.
2. F-Rating: 2 hours
3. Type of Fill Materials: As required to achieve rating.

H. Penetration Firestopping Systems for Metallic Pipes, Conduit, or Tubing FS-7:

1. UL-Classified Systems: C-AJ-8093
2. F-Rating: 2 hours.
3. T-Rating: Up to 2 hours

3.8 Type of Fill Materials: As required to achieve rating.

END OF SECTION 07 8413

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## SECTION 07 9200 - JOINT SEALANTS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Urethane joint sealants.
  - 2. Mildew-resistant joint sealants.
  - 3. Butyl joint sealants.
  - 4. Latex joint sealants.

#### 1.3 PREINSTALLATION MEETINGS

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

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Sustainable Design Submittals:
  - 1. Product Data: For sealants, indicating VOC content.
  - 2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Product Test Reports: For each kind of joint sealant, for tests performed by a qualified testing agency.
- C. Preconstruction Laboratory Test Schedule: Include the following information for each joint sealant and substrate material to be tested:
  - 1. Joint-sealant location and designation.
  - 2. Manufacturer and product name.
  - 3. Type of substrate material.
  - 4. Proposed test.
  - 5. Number of samples required.

- D. Preconstruction Laboratory Test Reports: From sealant manufacturer, indicating the following:
  - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
  - 2. Interpretation of test results and written recommendations for primers and substrate preparation are needed for adhesion.
- E. Preconstruction Field-Adhesion-Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.
- F. Field-Adhesion-Test Reports: For each sealant application tested.
- G. Sample Warranties: For special warranties.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Product Testing: Test joint sealants using a qualified testing agency.
  - 1. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

#### 1.7 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
  - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
  - 2. When joint substrates are wet.
  - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
  - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

#### 1.8 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.



- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Five years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
  - 1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
  - 2. Disintegration of joint substrates from causes exceeding design specifications.
  - 3. Mechanical damage caused by individuals, tools, or other outside agents.
  - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

## PART 2 - PRODUCTS

### 2.1 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content: Sealants and sealant primers shall comply with the following:
  - 1. Architectural sealants shall have a VOC content of 250 g/L or less.
  - 2. Sealants and sealant primers for nonporous substrates shall have a VOC content of 250 g/L or less.
  - 3. Sealants and sealant primers for porous substrates shall have a VOC content of 775 g/L or less.
- C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

### 2.2 URETHANE JOINT SEALANTS

- A. Urethane, S, NS, 25, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. BASF Corporation; Construction Systems.
    - b. Pecora Corporation.
    - c. Sika Corporation; Joint Sealants

### 2.3 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

- B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Dow Corning Corporation.
    - b. GE Construction Sealants; Momentive Performance Materials Inc.
    - c. Tremco Incorporated.

## 2.4 BUTYL JOINT SEALANTS

- A. Butyl-Rubber-Based Joint Sealants: ASTM C 1311.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Bostik, Inc.
    - b. Pecora Corporation

## 2.5 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Pecora Corporation.
    - b. Sherwin-Williams Company (The).
    - c. Tremco Incorporated

## 2.6 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Alcot Plastics Ltd.
    - b. BASF Corporation; Construction Systems.
    - c. Construction Foam Products; a division of Nomaco, Inc
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), Type O (open-cell material), Type B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

## 2.7 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
  - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
  - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Retain porous substrates in first four subparagraphs below if applicable. Insert additional items to suit Project.
  - 3. Remove laitance and form-release agents from concrete.
  - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or

by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

### 3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  - 1. Do not leave gaps between ends of sealant backings.
  - 2. Do not stretch, twist, puncture, or tear sealant backings.
  - 3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
  - 1. Place sealants so they directly contact and fully wet joint substrates.
  - 2. Completely fill recesses in each joint configuration.
  - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
  - 1. Remove excess sealant from surfaces adjacent to joints.
  - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
  - 3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

### 3.4 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates.
  - 1. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
    - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

2. Inspect tested joints and report on the following:
    - a. Whether sealants filled joint cavities and are free of voids.
    - b. Whether sealant dimensions and configurations comply with specified requirements.
    - c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.
  3. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.
  4. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
- B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

### 3.5 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

### 3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

### 3.7 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces JS-#1.
  1. Joint Locations:
    - a. Control and expansion joints on exposed interior surfaces of exterior walls.
    - b. Vertical joints on exposed surfaces of walls and partitions.
    - c. Other joints as indicated on Drawings.
  2. Joint Sealant: Urethane, S, NS, 25, NT.
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

- B. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement JS-#2.
1. Joint Locations:
    - a. Control joints on exposed interior surfaces of exterior walls.
    - b. Perimeter joints between interior wall surfaces and frames of **interior doors** and windows.
    - c. Other joints as indicated on Drawings.
  2. Joint Sealant: Acrylic latex.
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces JS-#3.
1. Joint Locations:
    - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
    - b. Other joints as indicated on Drawings.
  2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Concealed mastics JS-#4.
1. Joint Locations:
    - a. Aluminum thresholds.
    - b. Sill plates.
    - c. Other joints as indicated on Drawings.
  2. Joint Sealant: Butyl-rubber based.
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 07 9200

## SECTION 08 1213 - HOLLOW METAL FRAMES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes:
  - 1. Interior standard steel frames.
- B. Related Requirements:
  - 1. Section 08 7100 "Door Hardware" for door hardware for hollow-metal doors.

#### 1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

#### 1.4 COORDINATION

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
- B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

#### 1.5 PREINSTALLATION MEETINGS

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

#### 1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, fire-resistance ratings, and finishes.
- B. Shop Drawings: Include the following:
  - 1. Elevations of each frame type.

2. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
3. Locations of reinforcement and preparations for hardware.
4. Details of each different wall opening condition.
5. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.

- C. Product Schedule: For hollow-metal frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
1. Provide additional protection to prevent damage to factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow-metal frames vertically under cover at Project site with head up. Place on minimum 4-inch high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Ceco Door; ASSA ABLOY.
  2. Curries Company; ASSA ABLOY.
  3. Deansteel Manufacturing Company, Inc

#### 2.2 STANDARD STEEL FRAMES

- A. Construct hollow-metal frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Interior Frames: SDI A250.8. At locations indicated in the Door and Frame Schedule.
1. Materials: Uncoated steel sheet, minimum thickness of 0.067 inch.
  2. Construction: Knocked down.
  3. Exposed Finish: Prime.



## 2.3 FRAME ANCHORS

- A. Jamb Anchors:
  - 1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
  - 2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.
- B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.
- C. Material: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.

## 2.4 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153.
- C. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

## 2.5 FABRICATION

- A. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
  - 1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
  - 2. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
    - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
  - 3. Terminated Stops: Terminate stops 6 inches above finish floor with a 45-degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.
- B. Hardware Preparation: Factory prepare hollow-metal frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
  - 1. Comply with BHMA A156.115 for preparing hollow-metal frames for hardware.

## 2.6 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
  - 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General: Install hollow-metal frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions. Comply with SDI A250.11.
- B. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
  - 1. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
  - 2. Install frames with removable stops located on secure side of opening.
- C. Floor Anchors: Secure with postinstalled expansion anchors.
  - 1. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
- D. Solidly pack mineral-fiber insulation inside frames.
- E. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:
  - 1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
  - 2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
  - 3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
  - 4. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

### 3.2 CLEANING AND TOUCHUP

- A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

## SECTION 08 1416 - FLUSH WOOD DOORS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:

1. Solid-core doors with wood-veneer faces.
2. Factory finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

#### 1.3 PREINSTALLATION MEETINGS

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

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of door. Include details of core and edge construction. Include factory-finishing specifications.
- B. Sustainable Design Submittals:
  1. Product Data: For adhesives, indicating that product contains no urea formaldehyde.
- C. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:
  1. Dimensions and locations of blocking.
  2. Dimensions and locations of mortises and holes for hardware.
  3. Dimensions and locations of cutouts.
  4. Undercuts.
  5. Requirements for veneer matching.
  6. Doors to be factory finished and finish requirements.
  7. Fire-protection ratings for fire-rated doors.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.
- B. Quality Standard Compliance Certificates: WI Certified Compliance Program certificates.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in plastic bags or cardboard cartons.
- C. Mark each door on bottom rail with opening number used on Shop Drawings.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during remainder of construction period.
- B. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between **25 and 55** percent during remainder of construction period.

1.8 WARRANTY

- A. A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
    - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
  - 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
  - 3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Marshfield Doors, 1-800-869-3667
- B. Source Limitations: Obtain flush wood doors from single manufacturer.

2.2 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, "Architectural Wood Flush Doors."
- B. Adhesives: Do not use adhesives that contain urea formaldehyde.

- C. Composite Wood Products: Products shall be made without urea formaldehyde.
- D. WDMA I.S.1-A Performance Grade: Heavy Duty.
- E. WDMA I.S.1-A Performance Grade:
  - 1. Heavy Duty unless otherwise indicated.
- F. Particleboard-Core Doors:
  - 1. Particleboard: ANSI A208.1, Grade LD-2.
  - 2. Provide doors with structural-composite-lumber cores instead of particleboard cores for doors indicated to receive exit devices.
- G. Structural-Composite-Lumber-Core Doors:
  - 1. Structural Composite Lumber: WDMA I.S.10.
    - a. Screw Withdrawal, Face: 700 lbf.
    - b. Screw Withdrawal, Edge: 400 lbf.

## 2.3 VENEER-FACED DOORS FOR TRANSPARENT FINISH

- A. Interior Solid-Core Doors:
  - 1. Grade: Premium, with Grade A faces.
  - 2. Species: Red oak, "Toast" finish.
  - 3. Cut: Plain sliced.
  - 4. Match between Veneer Leaves: Match existing.
  - 5. Exposed Vertical Edges: Same species as faces or a compatible species - edge Type A.
  - 6. Core: Particleboard
  - 7. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering.
  - 8. WDMA I.S.1-A Performance Grade: Heavy Duty.

## 2.4 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
  - 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.

## 2.5 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
  - 1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on bottom edges, edges of cutouts, and mortises.
- B. Factory finish doors.
- C. Transparent Finish:
  - 1. Grade: Premium.
  - 2. Finish: WDMA TR-6 catalyzed polyurethane.
  - 3. Staining: "Toast".
  - 4. Sheen: Satin.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
  - 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
  - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Hardware: For installation, see Section 08 7100 "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

### 3.3 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08 1416

## SECTION 08 7100 - DOOR HARDWARE

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:

- 1. Mechanical door hardware for the following:
  - a. Swinging doors.
  - b. Sliding doors.
- 2. Cylinders for door hardware specified in other Sections.
- 3. Electrified door hardware.

- B. Related Requirements:

- 1. Section 08 1213 "Hollow Metal Frames" for door silencers provided as part of hollow-metal frames.

#### 1.3 COORDINATION

- A. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- B. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- C. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.
- D. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

#### 1.4 PREINSTALLATION MEETINGS

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

- 1. Conference participants shall include Installer's Architectural Hardware Consultant and Owner's security consultant.

- B. Keying Conference: Conduct conference at Project site.
  - 1. Conference participants shall include Installer's Architectural Hardware Consultant and Owner's security consultant.
  - 2. Incorporate conference decisions into keying schedule after reviewing door hardware keying system including, but not limited to, the following:
    - a. Flow of traffic and degree of security required.
    - b. Preliminary key system schematic diagram.
    - c. Requirements for key control system.
    - d. Requirements for access control.
    - e. Address for delivery of keys.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For electrified door hardware.
  - 1. Include diagrams for power, signal, and control wiring.
  - 2. Include details of interface of electrified door hardware and building safety and security systems.
- C. Samples: For each exposed product in each finish specified, in manufacturer's standard size.
  - 1. Tag Samples with full product description to coordinate Samples with door hardware schedule.
- D. Door Hardware Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant. Coordinate door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
  - 1. Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
  - 2. Format: Use same scheduling sequence and format and use same door numbers as in door hardware schedule in the Contract Documents.
  - 3. Content: Include the following information:
    - a. Identification number, location, hand, fire rating, size, and material of each door and frame.
    - b. Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
    - c. Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
    - d. Description of electrified door hardware sequences of operation and interfaces with other building control systems.
    - e. Fastenings and other installation information.



- f. Explanation of abbreviations, symbols, and designations contained in door hardware schedule.
  - g. Mounting locations for door hardware.
  - h. List of related door devices specified in other Sections for each door and frame.
- E. Keying Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and Architectural Hardware Consultant.
- B. Product Certificates: For each type of electrified door hardware.
  - 1. Certify that door hardware for use on each type and size of labeled fire-rated doors complies with listed fire-rated door assemblies.
- C. Product Test Reports: For compliance with accessibility requirements, for tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.
- D. Field quality-control reports.
- E. Sample Warranty: For special warranty.

#### 1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of door hardware to include in maintenance manuals.
- B. Schedules: Final door hardware and keying schedule.

#### 1.8 MAINTENANCE MATERIAL SUBMITTALS

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

#### 1.9 QUALITY ASSURANCE

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and of an Architectural Hardware Consultant who is available during the course of the Work to consult Contractor, Architect, and Owner about door hardware and keying.
  - 1. Warehousing Facilities: In Project's vicinity.
  - 2. Scheduling Responsibility: Preparation of door hardware and keying schedule.
  - 3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

- B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as an Architectural Hardware Consultant (AHC).

#### 1.10 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
- C. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

#### 1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including excessive deflection, cracking, or breakage.
    - b. Faulty operation of doors and door hardware.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
  - 2. Warranty Period: Three years from date of Substantial Completion unless otherwise indicated below:

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of door hardware from single manufacturer.
  - 1. Provide electrified door hardware from same manufacturer as mechanical door hardware unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

#### 2.2 PERFORMANCE REQUIREMENTS

- A. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

- C. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the DOJ's "2010 ADA Standards for Accessible Design".
1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
  2. Comply with the following maximum opening-force requirements:
    - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
    - b. Sliding or Folding Doors: 5 lbf applied parallel to door at latch.
    - c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
  3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
  4. Adjust door closer sweep periods so that, from an open position of 90 degrees, the door will take at least 5 seconds to move to a position of 12 degrees from the latch.
  5. Adjust spring hinges so that, from an open position of 70 degrees, the door will take at least 1.5 seconds to move to the closed position.

### 2.3 SCHEDULED DOOR HARDWARE

- A. Provide products for each door that comply with requirements indicated in Part 2 and door hardware schedule.
1. Door hardware is scheduled on Drawings.

### 2.4 HINGES

- A. Hinges: BHMA A156.1.
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Stanley Commercial Hardware; a division of Stanley Security Solutions.

### 2.5 MECHANICAL LOCKS AND LATCHES

- A. Lock Functions: As indicated in door hardware schedule.
- B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
1. Bored Locks: Minimum 1/2-inch latchbolt throw.
  2. Mortise Locks: Minimum 3/4-inch latchbolt throw.
  3. Deadbolts: Minimum 1-inch bolt throw.
- C. Lock Backset: 2-3/4 inches unless otherwise indicated.
- D. Lock Trim:
1. Description: As indicated on Drawings.

2. Levers: Cast.
    - a. Corbin Russwin – CL3330 Princeton - PZD.
  3. Escutcheons (Roses): Wrought.
  4. Dummy Trim: Match lever lock trim and escutcheons.
- E. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.
- F. Bored Locks: BHMA A156.2; Grade 1; Series 4000.
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Corbin Russwin, Inc.; an ASSA ABLOY Group company.
- 2.6 ELECTRIC STRIKES
- A. Electric Strikes: BHMA A156.31; Grade 1; with faceplate to suit lock and frame.
- 2.7 LOCK CYLINDERS
- A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver. Provide cylinder from same manufacturer of locking devices.
    1. Manufacturers: Subject to compliance with requirements, provide products by the following:
      - a. Corbin Russwin, Inc.; an ASSA ABLOY Group company.
  - B. Standard Lock Cylinders: BHMA A156.5; Grade 1 permanent cores; face finished to match lockset.
    1. Core Type: Interchangeable.
  - C. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.
- 2.8 KEYING
- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, appendix. Provide one extra key blank for each lock. Incorporate decisions made in keying conference.
    1. Existing System:
      - a. Master key or grand master key locks to Owner's existing system.
      - b. Re-key Owner's existing master key system into new keying system.

B. Keys: Brass.

1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
  - a. Notation: Information to be furnished by Owner.

2.9 SURFACE CLOSERS

- A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - a. DORMA USA, Inc.

2.10 MECHANICAL STOPS AND HOLDERS

- A. Wall- and Floor-Mounted Stops: BHMA A156.16.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - a. Allegion plc.

2.11 THRESHOLDS

- A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - a. C.R. Lawrence.

2.12 SLIDING DOOR HARDWARE

- A. Sliding Door Hardware: BHMA A156.14; consisting of complete sets including rails, hangers, supports, bumpers, floor guides, and accessories indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - a. Knape and Vogt.

## 2.13 METAL PROTECTIVE TRIM UNITS

- A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Allegion plc.

## 2.14 AUXILIARY DOOR HARDWARE

- A. Auxiliary Hardware: BHMA A156.16.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Peter Pepper Products.

## 2.15 FABRICATION

- A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rating labels and as otherwise approved by Architect.
  - 1. Manufacturer's identification is permitted on rim of lock cylinders only.
- B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.
- C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware unless otherwise indicated.
  - 1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.

## 2.16 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other 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 doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance of the Work.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Steel Doors and Frames: For surface-applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
- B. Wood Doors: Comply with door and hardware manufacturers' written instructions.

### 3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
  - 1. Wood Doors: DHI's "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.
  - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
  - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

- C. Hinges: Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Lock Cylinders: Install construction cores to secure building and areas during construction period.
  - 1. Furnish permanent cores to Owner for installation.
- E. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Architect.
- F. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 07 9200 "Joint Sealants."
- G. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.

### 3.4 FIELD QUALITY CONTROL

- A. Independent Architectural Hardware Consultant: Engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.
  - 1. Independent Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

### 3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
  - 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
  - 2. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 70 degrees and so that closing time complies with accessibility requirements of authorities having jurisdiction.
  - 3. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.

### 3.6 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.



3.7 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

END OF SECTION 08 7100

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## SECTION 09 2216 - NON-STRUCTURAL METAL FRAMING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Non-load-bearing steel framing systems for interior partitions.

#### 1.3 ACTION SUBMITTALS

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

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of code-compliance certification for studs and tracks.
- B. Evaluation Reports: For firestop tracks, post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

#### 1.5 QUALITY ASSURANCE

- A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

## 2.2 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
  2. Protective Coating: ASTM A 653, G40 hot-dip galvanized unless otherwise indicated.
- B. Studs and Tracks: ASTM C 645.
1. Steel Studs and Tracks:
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) MarinoWARE.
      - 2) MBA Building Supplies.
      - 3) Steel Network, Inc. (The).
    - b. Minimum Base-Metal Thickness: As indicated on Drawings
    - c. Depth: As indicated on Drawings.
- C. Slip-Type Head Joints: Where indicated, provide one of the following:
1. Single Long-Leg Track System: ASTM C 645 top track with 2 inch deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top track and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
  2. Double-Track System: ASTM C 645 top outer tracks, inside track with 2-inch deep flanges in thickness not less than indicated for studs and fastened to studs, and outer track sized to friction-fit over inner track.
  3. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) ClarkDietrich Building Systems.
      - 2) MarinoWARE.
      - 3) MBA Building Supplies
- D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. ClarkDietrich Building Systems.
    - b. MarinoWARE.
    - c. MRI Steel Framing, LLC.
  2. Minimum Base-Metal Thickness: As indicated on Drawings.

### 2.3 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
  - 1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide one of the following:
  - 1. Asphalt-Saturated Organic Felt: ASTM D 226/D 226M, Type I (No. 15 asphalt felt), nonperforated.
  - 2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754.
  - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

### 3.3 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
  - 1. Single-Layer Application: 16 inches unless otherwise indicated.
  - 2. Multilayer Application: 16 inches unless otherwise indicated.

- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
  - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
  - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.
    - a. Install two studs at each jamb unless otherwise indicated.
    - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
    - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
  - 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
  - 4. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
- E. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

END OF SECTION 09 2216

## SECTION 09 2900 - GYPSUM BOARD

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:

- 1. Interior gypsum board.

- B. Related Requirements:

- 1. Section 09 2216 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.

#### 1.3 ACTION SUBMITTALS

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

- B. Sustainable Design Submittals:

- 1. Product Data: For adhesives and sealants, indicating VOC content.
- 2. Laboratory Test Reports: For adhesives and sealants, indicating compliance with requirements for low-emitting materials.

- C. Samples: For the following products:

- 1. Trim Accessories: Full-size Sample in 12-inch long length for each trim accessory indicated.

#### 1.4 QUALITY ASSURANCE

- A. Mockups: Build mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and to set quality standards for materials and execution.

- 1. Build mockups for the following:

- a. Each level of gypsum board finish indicated for use in exposed locations.

- 2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
- 3. Simulate finished lighting conditions for review of mockups.

## 1.5 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

## 1.6 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, and mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

### 2.2 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

### 2.3 INTERIOR GYPSUM BOARD

- A. Gypsum Wallboard: ASTM C 1396/C 1396M.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Georgia-Pacific Building Products.
    - b. National Gypsum Company.
    - c. United States Gypsum Company
  - 2. Thickness: 5/8 inch.
  - 3. Long Edges: Tapered.
- B. Gypsum Board, Type X: ASTM C 1396/C 1396M.



1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Georgia-Pacific Building Products.
  - b. National Gypsum Company.
  - c. United States Gypsum Company
2. Thickness: 5/8 inch.
3. Long Edges: Tapered.

## 2.4 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
  1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc galvanized-steel sheet.
  2. Shapes:
    - a. Cornerbead.
    - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
    - c. Expansion (control) joint.

## 2.5 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
  1. Interior Gypsum Board: Paper.
- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
  1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
  2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
  3. Fill Coat: For second coat, use setting-type, sandable topping compound.
  4. Finish Coat: For third coat, use setting-type, sandable topping compound.
  5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.

## 2.6 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
- C. Sound-Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

- D. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Hilti, Inc.
    - b. Pecora Corporation.
    - c. United States Gypsum Company.
  2. Sealant shall have a VOC content of 250 g/L or less.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
  1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
  2. Fit gypsum panels around ducts, pipes, and conduits.

3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

### 3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
  1. Wallboard Type: As indicated on Drawings.
- B. Single-Layer Application:
  1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
  2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
    - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
  3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

### 3.4 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect
- C. Interior Trim: Install in the following locations:
  1. Cornerbead: Use at outside corners, unless otherwise indicated.
  2. LC-Bead: Use at exposed panel edges.

### 3.5 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
  - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
  - 2. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated
    - a. Primer and its application to surfaces are specified in Section 09 9123 "Interior Painting."

### 3.6 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

## SECTION 09 5113 - ACOUSTICAL PANEL CEILINGS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes acoustical panels and exposed suspension systems for interior ceilings.
- B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

#### 1.3 PREINSTALLATION MEETINGS

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

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, 6 inches in size.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  - 1. Ceiling suspension-system members.
  - 2. Structural members to which suspension systems will be attached.
  - 3. Method of attaching hangers to building structure.
  - 4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.
  - 5. Size and location of initial access modules for acoustical panels.
  - 6. Items penetrating finished ceiling and ceiling-mounted items including the following:
    - a. Lighting fixtures.
    - b. Diffusers.
    - c. Grilles.
    - d. Speakers.
    - e. Sprinklers.
    - f. Access panels.
    - g. Perimeter moldings.

7. Show operation of hinged and sliding components covered by or adjacent to acoustical panels.
8. Minimum Drawing Scale: 1/4 inch = 1 foot.

B. Qualification Data: For testing agency.

C. Product Test Reports: For each acoustical panel ceiling, for tests performed by a qualified testing agency.

D. Evaluation Reports: For each acoustical panel ceiling suspension system and anchor and fastener type, from ICC-ES.

E. Field quality-control reports.

#### 1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

#### 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. Acoustical Ceiling Units: Full-size panels equal to 2 percent of quantity installed.
2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.
3. Hold-Down Clips: Equal to 2 percent of quantity installed.

#### 1.8 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockup of typical ceiling area as shown on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

## 1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame-Spread Index: Class A according to ASTM E 1264.
  - 2. Smoke-Developed Index: 50 or less.

### 2.3 ACOUSTICAL PANELS ACT-1

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 1. Armstrong World Industries, Inc. – Cirrus Tegular 589HRC
- B. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E 1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.
- C. Classification: Provide panels as follows:
  - 1. Type and Form: Type III, mineral base with painted finish; Form 1.
  - 2. Pattern: as indicated by manufacturer's designation.
- D. Color: White
- E. Light Reflectance (LR): Not less than 0.86.
- F. Ceiling Attenuation Class (CAC): Not less than 35.
- G. Noise Reduction Coefficient (NRC): Not less than 0.70.
- H. Edge/Joint Detail: Beveled Tegular.

- I. Thickness: 3/4 inch.
- J. Modular Size: 24 by 24 inches.
- K. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273, ASTM D 3274, or ASTM G 21 and evaluated according to ASTM D 3274 or ASTM G 21.

## 2.4 METAL SUSPENSION SYSTEM

- A. Manufacturers: Basis of Design:
  - 1. Armstrong World Industries, Inc. – 9/16" Silhouette XL Bolt Slot Grid ¼" reveal
- B. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C 635 and designated by type, structural classification, and finish indicated.
- A. Double-WebSteel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 coating designation.
  - 1. Structural Classification: Intermediate duty system.
  - 2. Cap Material: Cold-rolled steel.
  - 3. Cap Finish: Painted white.

## 2.5 ACCESSORIES

- A. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
  - 1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing according to ASTM E 488/E 488M or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
  - 2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E 1190, conducted by a qualified testing and inspecting agency.
- B. Wire Hangers, Braces, and Ties: Provide wires as follows:
  - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
  - 2. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.135-inch diameter wire.



## 2.6 METAL EDGE MOLDINGS AND TRIM

- A. Manufacturers: Basis of Design:
- B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.
  - 1. Edge moldings shall fit acoustical panel edge details and suspension systems indicated and match width and configuration of exposed runners unless otherwise indicated.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.
- B. Layout openings for penetrations centered on the penetrating items.

### 3.3 INSTALLATION

- A. Install acoustical panel ceilings according to ASTM C 636, seismic design requirements, and manufacturer's written instructions.
- B. Suspend ceiling hangers from building's structural members and as follows:
  - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
  - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.

4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
  5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
  6. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
  7. Do not attach hangers to steel deck tabs.
  8. Do not attach hangers to steel roof deck. Attach hangers to structural members.
  9. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
  10. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
- C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
  2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends. Miter corners accurately and connect securely.
  3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- D. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- E. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit.
1. For reveal-edged panels on suspension-system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension-system surfaces and panel faces flush with bottom face of runners.
  2. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
  3. Protect lighting fixtures and air ducts according to requirements indicated for fire-resistance-rated assembly.
- 3.4 ERECTION TOLERANCES
- A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet, non-cumulative.
- B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet, non-cumulative.

### 3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
  - 1. Periodic inspection during the installation of suspended ceiling grids according to ASCE/SEI 7.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Perform the following tests and inspections of completed installations of acoustical panel ceiling hangers and anchors and fasteners in successive stages and when installation of ceiling suspension systems on each floor has reached 20 percent completion, but no panels have been installed. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations of acoustical panel ceiling hangers show compliance with requirements.
  - 1. Within each test area, testing agency will select one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf of tension.
  - 2. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.
- D. Acoustical panel ceiling hangers, anchors, and fasteners will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

### 3.6 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.
- B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 5113

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## SECTION 09 6513 - RESILIENT BASE AND ACCESSORIES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Thermoset-rubber base.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
  - 1. Product Data: For adhesives, indicating VOC content.
  - 2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
  - 3. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
- C. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.

#### 1.4 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. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

## 1.6 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following periods:
  - 1. 48 hours before installation.
  - 2. During installation.
  - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

## PART 2 - PRODUCTS

### 2.1 THERMOSET-RUBBER BASE, B-17

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 1. Roppe Corp
  - 2. Product Standard: ASTM F 1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).
  - 3. Style and Location:
    - a. Style A, Straight: Provide in areas with carpet.
    - b. Style B, Cove: Provide in areas with resilient floor coverings.
- B. Thickness: 0.125 inch.
- C. Height: 4 inches.
- D. Lengths: Coils in manufacturer's standard length.
- E. Outside Corners: Preformed.
- F. Inside Corners: Preformed.
- G. Colors: 100 Black.

### 2.2 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

### 2.3 VINYL MOLDING ACCESSORY TS-2

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 1. Johnsonite; a Tarkett company.
- B. Description: Vinyl transition strips SLT-20-H.
- C. Profile and Dimensions: As indicated.
- D. Locations: Provide vinyl molding accessories in areas indicated.
- E. Colors: "Charcoal"

### 2.4 INSTALLATION MATERIALS

- A. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.
  - 1. Adhesives shall have a VOC content of 50 g/L or less.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
  - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
  - 1. Installation of resilient products indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until materials are the same temperature as space where they are to be installed.
  - 1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

- D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

### 3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.

### 3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

### 3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
  - 1. Remove adhesive and other blemishes from surfaces.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 09 6513



## SECTION 09 6543 - LINOLEUM FLOORING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Linoleum sheet flooring.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
  - 1. Product Data: For adhesives, indicating VOC content.
  - 2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
- C. Shop Drawings: For each type of linoleum flooring.
  - 1. Include flooring layouts, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
  - 2. Show details of special patterns.
- D. Samples: For each exposed product and for each color and pattern specified in manufacturer's standard size, but not less than 6-by-9-inch sections.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of linoleum flooring to include in maintenance manuals.

## 1.6 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. Sheet Flooring: Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, in roll form and in full roll width for each type, color, and pattern of sheet flooring installed.

## 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for flooring installation and seaming methods indicated.
  - 1. Engage an installer who employs workers for this Project who are trained or certified by flooring manufacturer for installation techniques required.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store flooring and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 65 deg F or more than 90 deg F.
  - 1. Sheet Flooring: Store rolls upright.

## 1.9 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive flooring during the following periods:
  - 1. 72 hours before installation.
  - 2. During installation.
  - 3. 72 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during flooring installation.
- D. Close spaces to traffic for 72 hours after flooring installation.
- E. Install flooring after other finishing operations, including painting, have been completed.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For linoleum flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

## 2.2 LINOLEUM SHEET FLOORING VF-5

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Forbo Industries, Inc., Marmoleum Real, Color #3053 "Dove Blue"

- B. Linoleum Sheet Flooring: ASTM F 2034, Type I, linoleum sheet with backing.

1. Roll Size: In manufacturer's standard length, but not less than 78 inches wide.

- C. Thickness: 0.10 inch.

- D. Heat-Welding Bead: For seamless installation, solid-strand product of linoleum flooring manufacturer.

1. Colors: Match linoleum flooring.

- E. Colors and Patterns: As indicated by manufacturer's designations.

## 2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by linoleum flooring manufacturer for applications indicated.

- B. Adhesives: Water-resistant type recommended by flooring and adhesive manufacturers to suit products and substrate conditions indicated.

1. Adhesives shall have a VOC content of 50 g/L or less.

- C. Floor Polish: Provide protective, liquid floor-polish products recommended by linoleum flooring manufacturer.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of flooring.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Prepare substrates according to linoleum flooring manufacturer's written instructions to ensure adhesion of flooring.
- B. Concrete Substrates: Prepare according to ASTM F 710.
  - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
  - 2. Remove substrate coatings and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by linoleum flooring manufacturer. Do not use solvents.
  - 3. Alkalinity and Adhesion Testing: Perform tests recommended by linoleum flooring manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
  - 4. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install flooring until materials are the same temperature as space where they are to be installed.
  - 1. At least 72 hours in advance of installation, move flooring and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by flooring.

### 3.3 INSTALLATION, GENERAL

- A. Comply with manufacturer's written instructions for installing flooring.
- B. Scribe and cut flooring to butt neatly and tightly to vertical surfaces and permanent fixtures, including built-in furniture, cabinets, pipes, outlets, edgings, thresholds, door frames, and nosings.
- C. Extend flooring into toe spaces, door reveals, closets, and similar openings.
- D. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on flooring as marked on substrates. Use chalk or other nonpermanent marking device.
- E. Adhere flooring to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- F. Heat-Welded Seams: For seamless installation, comply with ASTM F 1516. Rout joints and heat weld with welding bead to fuse sections permanently into a seamless flooring installation. Prepare, weld, and finish seams to produce surfaces flush with adjoining flooring surfaces.

### 3.4 LINOLEUM SHEET FLOORING INSTALLATION

- A. Unroll linoleum sheet flooring and allow it to stabilize before cutting and fitting.
- B. Lay out linoleum sheet flooring as follows:
  - 1. Maintain uniformity of flooring direction.
  - 2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in flooring substrates.
  - 3. Match edges of flooring for color shading at seams.
  - 4. Avoid cross seams.
  - 5. Eliminate deformations that result from hanging method used during drying process (stove bar marks).

### 3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting linoleum flooring.
- B. Perform the following operations immediately after completing linoleum flooring installation:
  - 1. Remove adhesive and other blemishes from surfaces.
  - 2. Sweep and vacuum surfaces thoroughly.
  - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect linoleum flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, adhesive, and blemishes from linoleum flooring surfaces before applying liquid floor polish.
  - 1. Apply two coat(s).
- E. After allowing drying room film (yellow film caused by linseed oil oxidation) to disappear, cover linoleum flooring until Substantial Completion.

END OF SECTION 09 6543

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## SECTION 09 6813 - TILE CARPETING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes modular carpet tile.
- B. Related Requirements:
  - 1. Section 02 4119 "Selective Demolition" for removing existing floor coverings.
  - 2. Section 09 6513 "Resilient Base and Accessories for resilient wall base and accessories installed with carpet tile.

#### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:
    - a. Review delivery, storage, and handling procedures.
    - b. Review ambient conditions and ventilation procedures.
    - c. Review subfloor preparation procedures.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
  - 2. Include manufacturer's written installation recommendations for each type of substrate.
- B. Sustainable Design Submittals:
  - 1. Product Data: For adhesives, indicating VOC content.
  - 2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
- C. Shop Drawings: For carpet tile installation, plans showing the following:
  - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.

2. Carpet tile type, color, and dye lot.
3. Type of subfloor.
4. Type of installation.
5. Pattern of installation.
6. Pattern type, location, and direction.
7. Pile direction.
8. Type, color, and location of insets and borders.
9. Type, color, and location of edge, transition, and other accessory strips.
10. Transition details to other flooring materials.

D. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.
2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch long Samples.

E. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.
- C. Sample Warranty: For special warranty.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
  1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
  2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

#### 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. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.

#### 1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.



1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI's "CRI Carpet Installation Standard."

1.10 FIELD CONDITIONS

- A. Comply with CRI's "CRI Carpet Installation Standard" for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.
- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.11 WARRANTY

- A. Warranties:
  - a. Lifetime Fiber Performance for Wear,
  - b. Lifetime for Tuft Bind Strength (edge ravel, yarn pulls, zippering),
  - c. Lifetime Protection from Delamination Failure,
  - d. Lifetime Fiber Performance for Static,
  - e. Lifetime Colorfastness to Atmospheric Contaminants,
  - f. Lifetime Stain Removal

PART 2 - PRODUCTS

2.1 CARPET TILE – C-2A

- A. Manufacturers: Basis of Design:
  - 1. J&J Invision; J&J Industries, Inc.
- B. Color: # 7412 Speak Your Mind.
- C. Pattern: Impulse III # 7246.
- D. Fiber Type: Encore BCF.
- E. Pile Characteristic: Level-loop pile.
- F. Density: 7061 oz./cu. yd.
- G. Gage: 1/10.

- H. Surface Pile Weight: 21 oz./sq. yd.
- I. Backing System: Nexus Modular.
- J. Size: 24 by 24 inches.
- K. Applied Treatments:
  - 1. Soil-Resistance Treatment: Manufacturer's standard treatment.
  - 2. Antimicrobial Treatment: Manufacturer's standard treatment that protects carpet tiles as follows:
    - a. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria, not less than 1-mm halo of inhibition for gram-negative bacteria, and no fungal growth, according to AATCC 174.

## 2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Commercialon® Premium Modular Pressure Sensitive Adhesive, a premium modular flooring adhesive specifically formulated for bonding J+J Flooring Group's Nexus® Modular PVC backed carpet to the floor.
  - 1. Adhesives shall have a VOC content of 50 g/L or less.
- C. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.
- B. Examine carpet tile for type, color, pattern, and potential defects.
- C. Concrete Slabs: Verify that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.
  - 1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
    - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.

- b. Relative Humidity Test: Using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
  - c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.
- D. Painted Subfloors: Perform bond test recommended in writing by adhesive manufacturer.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. General: Comply with CRI's "Carpet Installation Standards" and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.
- C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

### 3.3 INSTALLATION

- A. General: Comply with CRI's "CRI Carpet Installation Standard," Section 18, "Modular Carpet" and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- D. Maintain pile-direction patterns recommended in writing by carpet tile manufacturer.
- E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.
- H. Install pattern parallel to walls and borders.

### 3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
  - 1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
  - 2. Remove yarns that protrude from carpet tile surface.
  - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with CRI's "Carpet Installation Standard," Section 20, "Protecting Indoor Installations."
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

## SECTION 09 9123 - INTERIOR PAINTING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following interior substrates:
  - 1. Steel and iron.
  - 2. Gypsum board.

#### 1.3 DEFINITIONS

- A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
  - 1. Include Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
  - 2. Indicate VOC content.
- B. Sustainable Design Submittals:

1. Product Data: For paints and coatings, indicating VOC content.
2. Laboratory Test Reports: For paints and coatings, indicating compliance with requirements for low-emitting materials.

C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.

D. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

#### 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. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

#### 1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

A. Manufacturers: Basis of Design

1. Benjamin Moore & Co.
2. Sherwin-Williams Company (The).

B. Products: Subject to compliance with requirements, provide products listed in the Interior Painting Schedule for the paint category indicated.

#### 2.2 PAINT, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

- B. Material Compatibility:
1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. Emissions Requirements: Field-applied paints and coatings that are inside the weatherproofing system shall comply with either of the following:
1. Low-Emitting Materials: VOC emissions shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
  2. VOC content shall not exceed limits of authorities having jurisdiction and the following:
    - a. Flat Coatings: 50 g/L.
    - b. Nonflat Coatings: 100 g/L.
    - c. Primers, Sealers, and Undercoats: 100 g/L.
    - d. Shellacs, Clear: 730 g/L.
    - e. Shellacs, Pigmented: 550 g/L.
- D. Colors: As indicated in a color schedule.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
1. Concrete: 12 percent.
  2. Fiber-Cement Board: 12 percent.
  3. Masonry (Clay and CMUs): 12 percent.
  4. Wood: 15 percent.
  5. Gypsum Board: 12 percent.
  6. Plaster: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.
1. Application of coating indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
  - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- E. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

### 3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
  - 1. Use applicators and techniques suited for paint and substrate indicated.
  - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
  - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
  - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.



### 3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
  - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
  - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

### 3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

### 3.6 INTERIOR PAINTING SCHEDULE

- A. Steel Substrates:
  - 1. Latex System, Alkyd Primer MPI INT 5.1QQ (P-2):
    - a. Prime Coat: Shop primer specified in Section where substrate is specified.
    - b. Intermediate Coat: Latex, interior, matching topcoat.
    - c. Topcoat: Latex, interior (MPI Gloss Level 4) UltraSpec500 Semigloss, Color Rockport Gray, Color # HC 105, MPI #43.
- B. Gypsum Board Substrates:
  - 1. Latex over Latex Sealer System MPI INT 9.2A (P-1, P-4, P-27):
    - a. Prime Coat: Primer sealer, latex, interior, MPI #50.
      - 1) Sherwin Williams – Drywall Latex Primer.
    - b. Intermediate Coat: Latex, interior, matching topcoat.
    - c. Topcoat: Latex, interior (MPI Gloss Level 2), MPI #44, Super Paint Satin A87 Series.
      - 1) Colors:
        - a) P-1 Pearly White SW 7009
        - b) P-4 Solitude SW 6535

c) P-27 Tradewind SW 6278

END OF SECTION 09 9123

## SECTION 12 2113 - HORIZONTAL LOUVER BLINDS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:

- 1. Horizontal louver blinds with aluminum slats.

- B. Related Requirements:

- 1. Section 06 1053 "Miscellaneous Rough Carpentry" for wood blocking and grounds for mounting horizontal louver blinds and accessories.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For horizontal louver blinds, include fabrication and installation details.
- C. Samples: For each exposed product and for each color and texture specified, 12 inches long.
- D. Product Schedule: For horizontal louver blinds. Use same designations indicated on Drawings.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For horizontal louver blinds to include in maintenance manuals.

#### 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. Horizontal Louver Blinds: Full-size units equal to 5 percent of quantity installed for each size, color, texture, pattern, and gloss indicated, but no fewer than two units.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

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

## 1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not install horizontal louver blinds until construction and wet-work 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 horizontal louver blinds 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.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Source Limitations: Obtain horizontal louver blinds from single source from single manufacturer.

### 2.2 HORIZONTAL LOUVER BLINDS, ALUMINUM SLATS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 1. Hunter Douglas Contract:: Model #CE81.
- B. Slats: Aluminum; alloy and temper recommended by producer for type of use and finish indicated; with crowned profile and radius corners.
  - 1. Width: 1 inch.
  - 2. Thickness: Not less than 0.008 inch.
  - 3. Spacing: Manufacturer's standard.
  - 4. Finish: Manufacturer's standard.
- C. Headrail: Formed steel or extruded aluminum; long edges returned or rolled. Headrails fully enclose operating mechanisms on three sides.
  - 1. Manual Lift Mechanism: Manufacturer's standard
  - 2. Manual Tilt Mechanism: Enclosed worm-gear mechanism and linkage rod that adjusts ladders.
    - a. Tilt: Two-direction, positive stop or lockout limited at an angle of 60 degrees from horizontal, both directions.
    - b. Operator: Clear-plastic wand.
    - c. Over-Rotation Protection: Manufacturer's detachable operator or slip clutch to prevent over rotation of gear.
  - 3. Manual Lift-Operator and Tilt-Operator Lengths: Manufacturer's standard.
- D. Bottom Rail: Formed-steel or extruded-aluminum tube that secures and protects ends of ladders and lift cords and has plastic- or metal-capped ends.

1. Type: Manufacturer's standard.
- E. Lift Cords: Manufacturer's standard braided cord.
- F. Ladders: Evenly spaced across headrail at spacing that prevents long-term slat sag.
  1. Components: Provide rails, cords, ladders, and materials exposed to view matching or coordinating with slat color unless otherwise indicated.

## 2.3 HORIZONTAL LOUVER BLIND FABRICATION

- A. Product Safety Standard: Fabricate horizontal louver blinds to comply with WCMA A 100.1 including requirements for corded, flexible, looped devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:
- C. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.
  1. Lift-and-Tilt Mechanisms: With permanently lubricated moving parts.
- D. Mounting and Intermediate Brackets: Designed for removal and reinstallation of blind without damaging blind and adjacent surfaces, for supporting blind components, and for bracket positions and blind placement indicated.
- E. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to brackets and adjoining construction; type designed for securing to supporting substrate; and supporting blinds and accessories under conditions of normal use.
- F. Color-Coated Finish:
  1. Metal: For components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.

## 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

- A. Install horizontal louver blinds level and plumb, aligned and centered on openings, and aligned with adjacent units according to manufacturer's written instructions.

1. Locate so exterior slat edges are not closer than 1 inch from interior faces of glass and not closer than 1/2 inch from interior faces of glazing frames through full operating ranges of blinds.
2. Install mounting and intermediate brackets to prevent deflection of headrails.
3. Install with clearances that prevent interference with adjacent blinds, adjacent construction, and operating hardware of glazed openings, other window treatments, and similar building components and furnishings.

### 3.3 ADJUSTING

- A. Adjust horizontal louver blinds to operate free of binding or malfunction through full operating ranges.

### 3.4 CLEANING AND PROTECTION

- A. Clean horizontal louver blind surfaces after installation according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions in a manner acceptable to manufacturer and Installer that ensures that horizontal louver blinds are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged horizontal louver blinds that cannot be repaired in a manner approved by Architect before time of Substantial Completion.

END OF SECTION 12 2113

## SECTION 12 3623.13 - PLASTIC-LAMINATE-CLAD COUNTERTOPS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes plastic-laminate-clad countertops.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
  - 1. Product Data: For adhesives, indicating that product contains no urea formaldehyde.
  - 2. Product Data: For installation adhesives, indicating VOC content.
  - 3. Laboratory Test Reports: For installation adhesives, indicating compliance with requirements for low-emitting materials.
- C. Shop Drawings: For plastic-laminate-clad countertops.
  - 1. Include plans, sections, details, and attachments to other work. Detail fabrication and installation, including field joints.
  - 2. Show locations and sizes of cutouts and holes for items installed in plastic-laminate-clad countertops.
  - 3. Apply WI Certified Compliance Program label to Shop Drawings.
- D. Samples: Plastic laminates in each type, color, pattern, and surface finish required in manufacturer's standard size.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For installer and fabricator.
- B. Product Certificates: For the following:
  - 1. Composite wood products.
  - 2. High-pressure decorative laminate.
  - 3. Adhesives.
- C. Quality Standard Compliance Certificates: WI Certified Compliance Program.

## 1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Fabricator of products.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver countertops only after casework and supports on which they will be installed have been completed in installation areas.
- B. Store countertops in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.
- C. Keep surfaces of countertops covered with protective covering during handling and installation.

## 1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install countertops until wet-work is 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. Field Measurements: Where countertops are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Established Dimensions: Where countertops are indicated to fit to other construction, establish dimensions for areas where countertops are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

## PART 2 - PRODUCTS

### 2.1 PLASTIC-LAMINATE-CLAD COUNTERTOPS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of plastic-laminate-clad countertops indicated for construction, finishes, installation, and other requirements.
  - 1. Provide inspections of fabrication and installation together with labels and certificates from WI certification program indicating that countertops comply with requirements of grades specified.
- B. Grade: Custom.
- C. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGS
  - 1. Manufacturers: Basis of Design:



- a. Wilsonart Americas, 2501 Wilsonart Drive, PO Box 6110, Temple, Texas 76503-6110
  - b. Product: PL-2, Oiled Soapstone, color # 4882-38.
- D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
1. As indicated by manufacturer's designations.
- E. Edge Treatment: Same as laminate cladding on horizontal surfaces.
- F. Core Material: MDF made with exterior glue.
- G. Core Thickness: 3/4 inch.
1. Build up countertop thickness to 1-1/2 inches at front, back, and ends with additional layers of core material laminated to top.
- H. Paper Backing: Provide paper backing on underside of countertop substrate.

## 2.2 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard unless otherwise indicated.
1. Wood Moisture Content: 5 to 10 percent.
- B. Composite Wood and Products: Provide materials that comply with requirements of referenced quality standard for each type of countertop and quality grade specified unless otherwise indicated.
1. Composite Wood Products: Products shall be made without urea formaldehyde.
  2. MDF: Medium-density fiberboard, ANSI A208.2, Grade 130.

## 2.3 MISCELLANEOUS MATERIALS

- A. Adhesives: Do not use adhesives that contain urea formaldehyde.
- B. Adhesive for Bonding Plastic Laminate: As selected by fabricator to comply with requirements.
1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.
- C. Installation Adhesive:
1. Adhesives shall have a VOC content of 70 g/L or less.

## 2.4 FABRICATION

- A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

- B. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch over base cabinets. Ease edges to radius indicated for the following:
  - 1. Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.
- C. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
  - 1. Notify Architect seven days in advance of the dates and times countertop fabrication will be complete.
- D. Shop cut openings to maximum extent possible to receive appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately, and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
  - 1. Seal edges of cutouts by saturating with varnish.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Before installation, condition countertops to average prevailing humidity conditions in installation areas.
- B. Before installing countertops, examine shop-fabricated work for completion and complete work as required, including removal of packing.

#### 3.2 INSTALLATION

- A. Grade: Install countertops to comply with same grade as item to be installed.
- B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.
- C. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.
  - 1. Secure field joints in countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.
- D. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Countertop Installation: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

1. Install countertops level and true in line. Use concealed shims as required to maintain not more than a 1/8-inch-in-96-inches variation from a straight, level plane.
2. Secure backsplashes to tops with concealed metal brackets at 16 inches o.c. and to walls with adhesive.
3. Seal joints between countertop and backsplash, if any, and joints where countertop and backsplash abut walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

### 3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective countertops, where possible, to eliminate functional and visual defects. Where not possible to repair, replace countertops. Adjust joinery for uniform appearance.
- B. Clean countertops on exposed and semiexposed surfaces.
- C. Protection: Provide Kraft paper or other suitable covering over countertop surfaces, taped to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.

END OF SECTION 123623.13

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## SECTION 12 5900 - SYSTEMS FURNITURE

### PART 1 GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 Specifications Sections, apply to this Section.

#### 1.2 SECTION INCLUDES

- A. Rail, beam, frame, structural upright, core
- B. Panels/privacy screens
- C. Worksurfaces
- D. Task management systems
- E. Lighting
- F. Electrical and wire management comprises furniture systems

#### 1.3 RELATED SECTIONS

- A. Section 26 0500 - Common Work Results for Electrical.

#### 1.4 SUBMITTALS

- A. Submit under provisions of Section 01 3300 – Submittal Procedures.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Include construction details, material descriptions, dimensions of individual components profiles and finishes
  - 3. Storage and handling requirements and recommendations.
  - 4. Installation methods.
- B. Shop Drawings: Submit shop drawings indicating material characteristics, details of construction, connections, and relationship with adjacent construction. Include plans, elevations, sections, full size details and attachments to other work.

#### 1.6 QUALITY ASSURANCE

- A. Manufacturer's Representative shall provide technical factory responsibility and leadership for the work, representing the Manufacturer and the product provided under the terms of the Proposal. The Manufacturer's Representative shall work in close association with the Factory Certified Furniture Dealer assigned to this project.
- B. Factory Certified Furniture Dealer shall assume responsibility for coordinating the pricing, ordering, delivering and installing the entire project. The Dealer shall be factory-trained and certified at the highest level of training available to assume the responsibilities of projects of similar size and scope. The Dealer shall assign to the team Project

Management personnel to include:

1. Project Manager shall be responsible for scheduling, coordination and technical assistance with Government representatives, as required, throughout the duration of the project. With the Design Manager, this person shall ensure the overall coordination and review of the proposed installation drawings, which shall require DC Courts CPFMD approval prior to installation.
2. Design Manager shall be responsible for all design conversion related services, including installation drawings, product coordination and technical design issues coordinated with the Project Team and the Furniture Manufacturer. The Design Manager shall be responsible for field-verification needed for the installation drawings. This manager along with the Project Manager shall attend regular project meetings, report on issues concerning the installation and review the installation drawings to obtain Government approval prior to data order entry and installation.
3. On-Site Project Supervisor shall be highly specialized in the means and methods of construction and installation of the furniture system. This manager shall be responsible for ensuring that the installation remains on schedule. Thoroughly conversant in the product and installation, this supervisor shall work with the Design Manager to resolve additional order requirements, dealing with shortages or omissions that may occur. This manager shall interface with the DC Courts CPFMD representatives to resolve on-site conditions and coordination issues to ensure the success of the project. The On-Site Project Supervisor shall maintain the punch-list walkthrough with the CPFMD representatives and coordinate all work to resolve the installation prior to turnover to the DC Courts CPFMD.
4. Installation Team Manager shall oversee the day-to-day performance of the product installation team. This manager shall ensure the performance of the team, anticipating coordination problems and reporting these to the On-Site Project Supervisor. Actual punch list execution shall be the responsibility of this manager, who shall ensure that the details of the punch-list walkthrough are executed and fulfilled to the satisfaction of the DC Courts CPFMD.
5. Project Management Team Experience: Each member of the Project Management Team shall possess the following minimum qualifications for the Work:
  - a. Minimum Experience: Five (5) or more years of successful experience working with the proposed furniture system.
  - b. Similar Scope of Work: Prior project roles and responsibilities experience on projects of similar magnitude and scope.
  - c. Training Certification: Records of certification showing ongoing factory training of the installation team by the manufacturer of the furniture system.

#### 1.7 PRE-INSTALLATION MEETINGS

- A. Convene minimum two weeks prior to starting work of this section.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.

- B. Handling: Handle materials to avoid damage.

## 1.9 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

## 1.10 SEQUENCING

- A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

## 1.11 MAINTENANCE

- A. Operational Service: Provide manufacturer's maintenance agreement and take-back program service for system furniture installed in project

## PART 2 PRODUCTS

### 2.1 GENERAL

- A. Furniture components shall have similar construction and appearance, and ability to be integrated in the workspace.
- B. Code Compliance: All components and design shall meet IBC 2015 and NFPA 101.
- C. Fire Rating: All furniture components shall have a smoke development rating of 450 and a maximum flame spread rating of 25 and shall be rated as Class "A" when tested as specified herein.
- D. ANSI/BIFMA: All furniture components shall comply with the applicable ANSI/BIFMA Standards.
- E. Availability: A manufacturer's written guarantee of availability of components compatible with the original installation for a period of not less than five (5) years.

### 2.2 MANUFACTURERS

- A. Basis of Design: Haworth, Places.
- B. Substitutions: not permitted.

### 2.3 COMPONENTS

#### A PANEL FRAMES, PANEL FACES AND PANEL INSERTS

- a. Products: Places Panel System
- b. Product Quality & Aesthetics: Steel frame with tiled acoustical panel appearance to match existing.
- c. Dimensions: Panels shall be available in a variety of heights between 36" and 84" tall and widths capable of configuring typicals in the space provided. Panel widths must be available in 6" increments between the widths of 18" and 60".
- d. Panel Frame: Frames shall be constructed so as to accept side-supported cantilevered lower and upper components or freestanding components.

- e. Panel Thickness: Frames (with panel faces attached) shall match existing.
- f. Panel Face: Panel faces shall be removable from the frame without disassembly of the workstation. All panel faces shall have a tiles appearance. The following panel face finishes shall be provided as indicated on the typical:
  - 1. Fabric All fabric panel faces shall be 100% synthetic fabric, have a Class "A" fire rating and be tackable. Fabric pattern: Haworth Tatami, Color Jute W5-5.
  - 2. Trim finish: Trim/Finish – Gray Tone TR-G
- g. Raceway: Raceways, which are an integral part of the system, shall be available. Powered raceways shall provide access points for placement of receptacles. Raceway covers shall be replaceable without disassembly of the panel.
- h. Connections: Furniture systems shall be capable of connecting in a variety of configurations. Panel based systems shall allow for the connection of panels of differing heights and the connection of two, three or four panels from a single point.
- i. Component mounting: Panel based systems shall provide for the mounting of components at varying heights on both sides of the panel. Furniture systems not based on structural panels must allow for the support of overhead cabinets, shelves, work surfaces, task lighting, and paper management.
- j. Leveling and alignment: The system shall provide precise alignment of adjacent panels and/or components and shall include leveling glides to compensate for uneven floors. A minimum  $\frac{3}{4}$ " adjustment range is required. When placed on a level surface with the glides fully retracted the maximum distance between the panel and the floor shall be 1".

#### B. WORKSURFACES

- a. Products: Places work surface, installation accessories to match existing.
- b. The furniture system shall include worksurfaces which are panel/system supported
- c. Construction: Top surfaces shall be plastic laminate panels, Haworth Putty. Surfaces shall be balanced to resist warping, and undersides shall be smoothly finished. Edges shall match existing.
- d. Dimensions: The system shall include worksurface depths and widths as indicated on drawings.
- e. End Panels. Full height end panels shall be provided on ends of work surfaces where visible. Product line should also offer solid panel and accessories to match existing installation.
- f. Cable management. Work surfaces shall have a continuous reveal at back edge approximately 1" wide to permit the passage of power & equipment cables where the surface meets the panel.

#### C. SEATING

- a. Standard task chair, see drawings for product information.

#### D. SYSTEMS FURNITURE - POWER AND DATA DISTRIBUTION:



- a. Power and Data. Panels shall have a system capable of distributing power service and data service to multiple workstations through separate feed points.
- b. Base Feed: Power & Data must be capable of entering the furniture by the following methods:
  - 1. Power & Data feeds may be through separate junction boxes in wall located behind panels. Note: panels against wall shall be omitted.
- c. Power System. Power/Data panels shall include an electrical system that is UL rated and meets all current National Electrical Code (NFPA 70) requirements.
- d. Knockout plates capable of accepting duplex receptacles (20 amp 125 volt capacity) shall be provided in all identified powered panels.
- e. Duplex receptacles shall be provided as shown on the typical. Power outlets shall be 20 amps duplex (NEMA 5-20R). Each duplex outlet shall have a label that identifies the phase of the circuit to which it is connected. Power wiring system should have the capability of having the outlets installed back-to-back.
- f. The power wiring harness system shall be in the base of the panels.

### PART 3 - EXECUTION

#### 2.4 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 2.5 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

#### 2.6 INSTALLATION

- A. Install in accordance with manufacturer's instructions and in proper relationship with adjacent construction. Test for proper operation and adjust until satisfactory results are obtained.

#### 2.7 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 12 5900

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## SECTION 21 0101 - FIRE-SUPPRESSION GENERAL PROVISIONS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. General provisions and requirements for all fire-suppression work.

#### 1.2 RELATED SECTIONS

- A. Requirements of this section generally supplement requirements of Division 01.
- B. Division 01 includes sections specifying requirements for construction waste management.

#### 1.3 REFERENCES

- A. NFPA 10: Portable Fire Extinguishers.
- B. NFPA 241: Safeguarding Construction, Alteration, and Demolition Operations.

#### 1.4 SYSTEM DESCRIPTION

- A. The full set of Contract Documents applies to work of Division 21.
- B. Visit the site and study all aspects of the project and working conditions, as required by General and Supplementary Conditions, Bidding and Contracting Requirements, Drawings, and Specifications. Verify field dimensions.
- C. The work covered in technical sections includes the furnishing of all labor, equipment and materials, and the performance of all operations pertinent to the work described.
- D. Except as required otherwise in Division 01, promptly obtain and pay for, including all necessary signatures and paperwork, all permits, fees and inspections required for work of this division by authorities having jurisdiction, including any utility connection or extension charge. No payment will be made until a copy of the permit is forwarded to the Government.
- E. Fire-suppression work of this project includes, as a brief general description, the following:
  - 1. New sprinkler zone including zone control valve and branch sprinkler piping.
- F. See Division 01 for requirements related to Government's occupancy of the premises, limits on use of site, time restrictions on work, limits on utility outages or shutdowns, and phasing (sequencing) and scheduling.

#### 1.5 PRODUCT OPTIONS

- A. Except as modified by provisions of Bidding and Contracting Requirements and Division 01, these options apply to Division 21 specifications.
- B. General: Where Contractor is permitted to use a product other than the specified item and model named as the basis of design, Contractor is responsible for all coordination and additional costs as specified in the article "Substitutions," below for substitutions.

- C. Products specified by reference standards or by description only: Any product meeting those standards or description.
- D. Products specified by naming one or more manufacturers, or model name or catalog reference number: Products specified establish a standard of quality, options to be included, and performance, and shall not be construed as limiting competition. Contractor may use products of any manufacturer, which meet the specifications.
- E. Products specified by naming one manufacturer and particular product, with no provision for other options: No options or substitutions allowed.

#### 1.6 SUBSTITUTIONS

- A. Substitutions will be considered only as permitted or required by the Bidding and Contracting Requirements and Division 01. Except as modified by those requirements, the requirements below apply to Division 21 specifications.
- B. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.
- C. Document each request with complete data substantiating compliance of proposed substitution with contract documents.
- D. A request constitutes a representation that the Bidder or Contractor:
  - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
  - 2. Will provide the same warranty for the substitution as for the specified product.
  - 3. Will coordinate installation and make changes to other work which may be required for the work to be complete with no additional cost to the Government.
  - 4. Waives claims for additional costs or time extension which may subsequently become apparent.
  - 5. Will reimburse the Government for review or redesign services associated with re-approval by authorities.
- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitution submittal procedure is specified in Bidding and Contracting Requirements and Division 01.

#### 1.7 MATERIALS AND EQUIPMENT

- A. All materials and equipment shall be new and the best of their respective kinds, suitable for the conditions and duties imposed on them by the project and of representative manufacture. The description, characteristics and requirements of the materials to be used shall be in accordance with the specifications.
- B. All equipment, construction and installation must meet requirements of local, state and federal governing codes.

- C. Singular number: In cases where material, a device, or part of the equipment is referred to in the singular number in the specifications, it is intended that such reference shall apply to as many items of material, devices, or parts of the equipment as are required to complete the installation as shown on the drawings or required for proper operation of the system.
- D. Terms have the following meanings:
  - 1. Furnish: Supply item
  - 2. Install: Mount and connect item
  - 3. Provide: Furnish and install.
- E. All materials and equipment shall be installed and completed in a first class and workmanlike manner and in accordance with the best modern methods, practice and manufacturers' instructions. Any work which shall not present an orderly and neat or workmanlike appearance shall be removed and replaced with satisfactory work when so directed in writing by the COR.
- F. The specifications and drawings are intended to define the minimum requirements, as to quality of materials, construction, finish and overall workmanship.
- G. General Conditions describe the correlation and intent of the Contract Documents. In case of discrepancies between the specifications and drawings, the specifications should be followed as to the general methods and principles and the drawings followed as to sizes, capacities and specifics for corresponding parts. If sizes are omitted, the COR will determine sizes to be utilized.
- H. In all cases of doubt, uncertainty, or conflict as to the true meaning of the specifications or drawings, it is the responsibility of the Contractor to notify the COR of said uncertainty, doubt, or conflict and obtain a decision as to the intent before starting any work which may be affected by this decision.

## 1.8 COORDINATION

- A. Should a situation develop during construction to prevent the proper installation of any equipment or item where shown on the drawings, call the situation to the attention of the COR and await a written decision.
- B. Plan and coordinate all work to proceed in an orderly and continuous manner without undue delay, and in conformance with project schedule. Submit samples, shop drawings, schedules, insurance policies and certificates, and the like in time to avoid delays in actual construction. Coordinate work so that work of each trade is completed before other construction begins which would obstruct it.
- C. Coordinate trades to ensure that proper clearances between work of the various trades allow access to items which require operation and maintenance.
- D. Coordinate location and elevation of all piping, equipment, and appurtenances in such a manner that the finished installation is as indicated on drawings. In the event difficulties are encountered which prevent this, it is the Contractor's responsibility to bring this to the attention of the COR prior to initiation of work. Correct improperly coordinated installation at no additional cost.
- E. The Contractor's assistants shall include a competent mechanical foreman, who shall be on the premises at all times to check, layout, coordinate and superintend the installation of work. The foreman shall establish all grades and lines relative to the work before starting, and be responsible for the accuracy thereof.

## 1.9 SUBMITTALS

### A. Manufacturers' and subcontractors' lists:

1. As specified in Division 01, submit a complete list of proposed manufacturers for all equipment, materials and subcontractors used for the work of this division. Lists shall follow the sequence of the specifications. No considerations will be given for partial or incomplete lists. After review of lists, submit shop drawings and product data.

### B. Shop drawings and product data:

1. Submit in accordance with the requirements of Division 01 or as established at the preconstruction conference, the required number of copies of shop drawings and product data for every item of equipment. Shop drawings or product data will not be considered until manufacturers' lists have been approved. Shop drawings and product data shall be submitted, as required by the General Conditions, with sufficient time for checking, return to Contractor, and resubmission as required before Contractor shall install any item.
2. Each item submitted shall be properly labeled, indicating the specific service for which the equipment or material is to be used, section and paragraph number of specification or drawing number to which it applies, Contractor's name and project name and number. Data submitted shall be specific and shall include product data and printed information in sufficient detail and scope to verify compliance with requirements of the contract documents. Clearly identify each item within the data. Data of a general nature will not be accepted. Each sheet must clearly show the project name and number.
3. The review of a shop drawing or product data shall not be considered as a guarantee of the measurements or building conditions or that the shop drawings or product data have been checked to see that item submitted properly fits the building conditions. This review shall not relieve the Contractor of the responsibility for furnishing material or performing work as required by the contract documents, for correctness of dimensions and quantities, or for proper coordination of details and interfaces among trades.
4. All exclusively electrical items furnished as items associated with fire-suppression items but not specifically described in the fire-suppression item submission, shall be submitted as a separate submittal but shall be clearly marked as associated with the fire-suppression item by identification specification paragraph.
5. Product data sheets shall be 8.5-inches by 11-inches cut sheets for operating and maintenance manual.

### C. Submit at least three copies of the results of every test required under any section in this division.

### D. Specialist shall submit a list of at least three projects similar to this project in type, size, and quality, which have been in place and operating satisfactorily for at least five years.

1. Include project name, address, name and phone number of Government's representative, and project type and size.

### E. After the work is completed, submit all required certificates of approval from approved inspection agencies and authorities having jurisdiction over work of this division. Certificates of approval must be received by the COR prior to final acceptance of the work.

#### 1.10 SPECIALIST

- A. The term "Specialist" as used in the specification shall mean an individual or firm of established reputation (or, if newly organized, whose personnel have previously established a reputation in the same field,) which is regularly engaged in, and which maintains a regular force of workers skilled in either (as applicable) manufacturing or fabricating items required by the contract, installing items required by the contract, or otherwise performing work required by the contract. Where the specification requires installation by a specialist, the term shall also be deemed to mean the manufacturer of the item, an individual or firm licensed by the manufacturer, or an individual or firm who will perform the work under the manufacturer's direct supervision.

#### 1.11 CONTRACT CLOSEOUT SUBMITTALS

A. Project record documents:

1. Maintain on site one set of the following record documents; record actual revisions to the work of this division:
  - a. Contract drawings.
  - b. Specifications.
  - c. Addenda.
  - d. Change orders and other modifications to the Contract.
  - e. Reviewed shop drawings, product data, and samples.
2. Maintain record documents separate from documents used for construction.
3. Record information concurrent with construction progress.
4. Specifications: Legibly mark and record in each section a description of actual products installed, including the following:
  - a. Manufacturer's name and product model and number.
  - b. Product options, substitutions, or alternates utilized.
  - c. Changes made by addenda and modifications.
5. Record documents and shop drawings: Legibly mark each item to record actual construction, including:
  - a. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the work.
  - b. Field changes of dimension and detail.
  - c. Details not on original Contract Drawings.
6. Submit documents as specified in Division 01.

B. Operation and maintenance data:

1. Submit sets prior to final inspection as specified in Division 01. Unless otherwise specified in Division 01, submit no fewer than three sets. In addition to requirements specified in Division 01, submit operating and maintenance manuals for the work of this division as specified below.
2. Binders: Provide large enough binders, and sufficient quantity, that the required contents can be easily turned, removed, and reinserted.
  - a. Self-expanding fast lock type.
  - b. Three telescoping metal posts.

- c. Durable plastic covers.
  - d. Angle spline with guide flanges.
  - e. Text page size - 8.5 by 11 inches.
  - f. Boorum and Pease, Stock No. C-619-3 expansion 3 inch to 5 inch, or Stock No. C-1219 expansion 1.5 inch to 2.5 inch, or equal by National or Wilson Jones.
3. Prepare binder covers with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS," and title of project. Print on spine of binder "O & M INSTRUCTIONS." If more than one binder is required, print covers and spines with volume numbers. Include in the front of every binder an index to all binders.
  4. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
  5. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, typed on white paper.
  6. Part 1: Directory, listing names, addresses, and telephone numbers of mechanical engineers; Contractor; mechanical subcontractors; and major mechanical equipment suppliers.
  7. Part 2: Operation and maintenance instructions, arranged by specification section. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify the following:
    - a. Significant design criteria.
    - b. List of equipment, including operating weight of each piece.
    - c. Parts list for each component, including recommended spare parts list.
    - d. Operating instructions.
  8. Part 3: Project documents and certificates, including the following:
    - a. Shop drawings and product data.
    - b. Photocopies of certificates.
    - c. Photocopies of warranties and guarantees.
    - d. Test reports: Copies of the results of all tests required under all sections of specifications.
  9. Submit one copy of completed volumes in final form 15 days prior to final inspection. This copy will be returned after final inspection, with Engineer comments. Revise content of documents as required prior to final submittal.
  10. Submit final volumes revised, within ten days after final inspection.

#### 1.12 REGULATORY REQUIREMENTS

- A. When these specifications call for materials or construction of a better quality or larger sizes than required by the following codes and standards, the provisions of the specifications shall take precedence.
- B. Provide, without extra charge, any additional materials and labor that may be required for compliance with these codes and standards even though the work is not mentioned in these specifications or shown on the contract drawings.
- C. Perform the work of this division in strict accordance with the following authorities. The latest revision of these codes accepted by the authority having jurisdiction as of the date of the contract documents shall apply.
  1. The plumbing, mechanical, electrical, building, fire, and safety codes of the state and county or city in which the work is being performed.
  2. The National Electric Code, NFPA 70 (NEC).



3. The National Fire Protection Association Code. (NFPA).
4. International Energy Conservation, Fire, Fuel Gas, Mechanical, and Plumbing Codes (ICC).

#### 1.13 REFERENCE STANDARDS

- A. Perform the work of this division using the standards of the following organizations, as referred to in technical sections, as a minimum requirement for construction and testing. Unless otherwise specified in Bidding and Contract Documents or Division 01, the latest revision current as of the date of the contract documents shall apply. Products shall be certified by manufacturers to meet the requirements of referenced standards.

1. American National Standards Institute (ANSI)
2. ASME International (ASME)
3. American Society for Testing and Materials (ASTM)
4. American Society of Sanitary Engineering (ASSE)
5. American Water Works Association (AWWA)
6. International Code Council (ICC)
7. Manufacturer's Standardization Society of the Valve and Fittings Industry Inc. (MSS)
8. National Electrical Code, NFPA 70 (NEC)
9. National Electrical Manufacturer's Association (NEMA)
10. National Fire Protection Association (NFPA)
11. National Sanitary Foundation (NSF)
12. The Occupational Safety and Health Act (OSHA)
13. Piping and Drainage Institute (PDI)
14. Underwriters Laboratory Inc. (UL)
15. Maryland Occupational Safety and Health Act (MOSHA)

#### 1.14 TEMPORARY STORAGE

- A. Maintain upon premises, where directed, a storage area, and be responsible for all contents within these areas. Provide all security measures necessary for this area.
- B. Area shall be maintained and shall be returned to original condition at the completion of the project.

#### 1.15 PROTECTION

- A. Control dust resulting from construction work to prevent its spread beyond the immediate work area, and to avoid creation of a nuisance.
1. Do not use water to control dust. Use drop cloths or other suitable barriers.
  2. In areas where dirt or dust is produced as a result of the work, sweep daily, or more often as required.
  3. Provide walk-off mats at entries and replace them at regular intervals.
  4. Construct dust partitions, where indicated on the drawings or as required.
  5. Protect areas occupied by Government personnel or equipment.
  6. Seal off all return air registers and other mechanical systems to prevent dust from entering.
- B. Each trade and subcontractor is responsible for preventing damage and soiling of work performed by other trades or subcontractors. Each trade and subcontractor is responsible for providing temporary protection of its own work.
1. Protect work from spills, splatters, drippings, adhesives, bitumens, mortars, paints, plasters, and damage from welding or burning.

2. Protect finished work from damage, defacement, staining, or scratching.
  3. Protect finishes from cleaning agents, or grinding and finishing equipment.
  4. Protect adjacent and finished work from damage, using tape, masking, covers or coatings and protective enclosures.
  5. Coordinate installations and temporarily remove items to avoid damage from finishing work.
- C. Repair all damage or soiling to the complete satisfaction of the COR; replace any materials or work damaged to such an extent that they cannot be restored to their original condition, all at no addition to the Contract Sum.
- D. Protect work stored in place and supplies stored in the building.
1. Store materials and products, subject to damage from moisture, in dry locations. If necessary, provide in protective wraps or covers.
  2. Store plastics, other materials, and products subject to damage from heat or cool at manufacturer's recommended temperatures.
- E. Use of sidewalk or roadway areas outside of the property lines shall be with permission and approval of the local authorities having jurisdiction.

#### 1.16 FIRE PROTECTION

- A. As a minimum, provide hand-carried, portable, UL-rated extinguishers with each work crew working inside the building.
- B. Select extinguishers in accordance with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

#### 1.17 PROJECT CONDITIONS

- A. Drawings showing utilities in concealed locations are based on the best information available but are not represented as being precisely correct. Work of the contract includes digging, cutting, drilling, using nondestructive methods, and other methods of locating concealed utilities in the field, as well as patching and repairing as specified in "Cutting and Patching" below.
- B. If, in the course of the work, workers encounter a material they suspect to present some hazard:
  1. Promptly notify the COR in writing.
  2. Do not perform any work which would disturb the suspected material until written instructions have been received.

#### 1.18 WARRANTY

- A. All work and equipment provided as work of this division shall be fully warranted under the general project warranty. In addition, provide added special warranties specified in individual sections.
- B. During the correction period, the Contractor shall promptly correct any work found to be not in accordance with the requirements of the Contract Documents, on receipt of written notice from the COR. Except as otherwise required in General Conditions and Division 01, the correction period is one year after the date of substantial completion of the work. Work requiring correction shall promptly be repaired or completely replaced at no addition to the Contract Sum.

- C. When use of the permanent equipment has been permitted for temporary heating or ventilation of the building, the warranty and correction periods shall nevertheless begin at the time of substantial completion, unless another date of acceptance has been agreed to by the Government.
- D. Special warranties are warranties required by individual specification sections, incidental product warranties, manufacturers' standard warranties, installer or subcontractor service agreements, and other individual warranties in addition to the general project warranty.
- E. Provide copies of warranties as required for Operation and Maintenance Manual specified above, and by Division 01.
- F. For items of work delayed beyond date of substantial completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

## PART 2 - PRODUCTS

Not used.

## PART 3 - EXECUTION

### 3.1 CUTTING AND PATCHING

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
- B. Cut walls, floors, partitions, roofs, and other appurtenances for the passage or accommodation of pipes, ducts and appurtenances. Close superfluous openings and remove all debris caused by work of this division.
- C. No cutting of any structure or finish shall be done until the condition requiring such cutting has been examined and approved by the COR.
- D. New or existing surfaces disturbed as a result of such cutting or otherwise damaged shall be restored to match original work and all materials used for any patching or mending shall conform to the class of materials originally installed.
- E. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

### 3.2 TEMPORARY FACILITIES

- A. Temporary water facilities, electricity, telephone, toilet facilities, and temporary heat, shall be provided as specified in Division 01.

### 3.3 PROGRESS MEETINGS

- A. Progress meetings shall be held as specified in Division 01, and also when and if the Contractor or COR finds them necessary or advantageous to progress of work.

- B. Contractor, those subcontractors and those material suppliers concerned with current progress or with the scheduling of future progress, and the Government shall each be represented at these meetings by persons familiar with the details of work and authorized to conclude matters relating to work progress.

END OF SECTION 21 0101

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## SECTION 21 0500 - COMMON WORK RESULTS FOR FIRE SUPPRESSION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Basic material and equipment required for the fire-suppression piping work as indicated on the drawings and specified in Division 21.
- B. Other requirements applicable to more than one section of Division 21.
- C. Identification of fire-suppression systems and equipment.

#### 1.2 RELATED SECTIONS

- A. Division 01 includes sections specifying requirements for commissioning and construction waste management.
- B. Project and special warranties: Division 01 and Section 21 0101.
- C. Operation and Maintenance Manuals: Division 01 and Section 21 0101.

#### 1.3 DEFINITIONS

- A. Project correction period: A period after Substantial Completion of the work during which the Contractor shall correct every part of the work found to be not in accordance with the requirements of the contract documents, promptly after receipt of written notice.
- B. Qualified testing agency: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
  - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
  - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- C. DN: Dimension Nominale, nominal pipe size in millimeters, in accordance with the metric system for construction, Systeme Internationale (SI).
- D. NPS: Nominal pipe size in inches, in accordance with standard U.S. designations for manufactured pipe. Pipe sizes do not change when projects are designed and built in metric units; each size has a consistent name (nominal dimension) in each system.

#### 1.4 DESIGN REQUIREMENTS

- A. The drawings and system performances have been designed based on using the particular manufacturer's products specified and scheduled on the drawings.
- B. Products of other manufacturers that are listed under the article "Available Manufacturers," or permitted as "equal," are permitted provided:
  - 1. Product shall meet the specifications.

2. Contractor shall make, without addition to the contract sum, all adjustments for deviations so that the final installation is complete and functions as the design basis product is intended.
- C. Do not propose products with dimensions or other characteristics different from the design basis product that render their use impractical, or cause functional fit, access, or connection problems.
- D. The contract drawings are generally diagrammatic and do not indicate all fittings or offsets in pipe, all access panels, or other specialties required.
  1. Install pipe exposed to view parallel with the lines of the building and as close to walls, columns, and ceilings as may be practical, maintaining proper clearances for access at all parts requiring servicing.
  2. Install pipe a sufficient distance from other work to permit a clearance of not less than 0.5 inch (15 mm) between its finished covering and adjacent work.
  3. No pipe shall be run below the head of a window or door.
  4. Pull boxes and other appurtenances which require operation or maintenance shall be easily accessible. Do not cut or form handholes for operation or maintenance of appliances through walls or ceilings.

#### 1.5 SUBMITTALS

- A. Shop drawings:
  1. Schedule of welding and brazing procedures proposed for each piping system included in the project.
- B. Certifications: Proof of operator and testing agency personnel qualifications as required for welding and brazing in the article "Quality Assurance" below.
- C. Test reports: Field test results for each piping system as specified in Part 3 below.

#### 1.6 QUALITY ASSURANCE

- A. Provide materials and perform work in accordance with the plumbing, mechanical, electrical, building, fire, health and safety, and other applicable codes and regulations of the state, county or city in which the work is performed.
- B. Welding procedures and operator qualifications for structural welding: AWS D1.1, Structural Welding Code Steel, electric arc process.
- C. Welding, brazing, and soldering procedures and operator qualifications for building systems piping:
  1. AWS D10.9, Qualification of Welding Procedures and Welders for Piping and Tubing.
  2. ASME B31.9, Building Services Piping.
- D. Qualifications of independent testing laboratory personnel:
  1. Welding inspectors: AWS QC1, Certification of Welding Inspectors.
- E. Electrical control panels, equipment, materials and devices provided or installed as work of Division 21 shall bear UL label or, if UL label is not available, the item shall be tested and labeled by a qualified testing agency, acceptable to authorities having jurisdiction, and in accordance with NFPA 70 (NEC). Provide testing, if required, without addition to the contract sum.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. General piping techniques, testing, identification, painting, and operating instructions specified in this section apply to products specified in other sections of Division 21.
- B. Rust-inhibitive paint: Alkyd based, equal to Benjamin Moore Super Spec HP D.T.M. Alkyd Low Lustre P23; white, black, or bronzetone; applied in a wet film thickness of at least 2.9 mils (0.07 mm).
- C. Weldolets and thredolets: Fittings designed for installing branches on piping, with either welded or threaded connection to branch; conforming to ASTM A 234.
- D. Pipe jointing compound:
  - 1. Polytetrafluoroethylene (PTFE) pipe thread tape, "Teflon."
  - 2. Pipe cement and oil.

### 2.2 IDENTIFICATION DEVICES AND MATERIALS

- A. Stenciling materials:
  - 1. Stencils: Manufactured standard stencils prepared for required applications, conforming to ANSI A13.1 for color and size of legend letters, including arrows showing direction of flow.
  - 2. Paint: Exterior type enamel, colors conforming to ANSI A13.1, or black.
- B. Equipment identification tags:
  - 1. Laminated plastic with adhesive back, white core and black outer layers, which, when engraved, will produce white letters and numerals on a black background.
  - 2. Tags installed on curved surfaces shall be aluminum or brass.
- C. Valve tags: Brass, 1.5 inch (40 mm) in diameter with black-filled numbers not less than 0.25 inch (6 mm) high, complete with brass attachment chains.
- D. Ceiling identification tags: Laminated plastic with adhesive back, engraved black letters on white background, minimum 0.5 inch (15 mm) wide and length as required for 0.375 inch (10 mm) high letters for name of concealed device and number.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF PRODUCTS AND EQUIPMENT

- A. Manufacturers' instructions: Except as modified by drawings or specifications, install products and equipment in accordance with manufacturers' instructions and recommendations applicable to the project conditions.
  - 1. Immediately notify the COR if a difference or discrepancy is found between manufacturers' instructions and the drawings or specifications.

### 3.2 PIPE INSTALLATION



- A. Remove burrs resulting from cutting pipe or from any other operation.
- B. Threaded connections:
  - 1. Cut threads full and clean.
  - 2. Apply specified pipe jointing compound or tape on male threads only.
- C. Thoroughly clean pipe and fittings before they are installed, and keep them clean until the acceptance of the completed work. Cap or plug the ends of the lines so as to prevent earth and other debris from entering during construction.
- D. Black steel piping NPS 2.5 (DN 65) and larger shall be welded; NPS 2 (DN 50) and smaller shall be threaded, except as required otherwise in a particular section.
- E. Do not weld galvanized piping.
- F. Use welding fittings, tees, wyes, reducers, eccentric reducers, and caps as required. Branches at least two nominal pipe sizes less than the main may be made with "Weldolets" or "Thredolets" installed with full size opening in larger pipe and in accordance with manufacturer's printed instructions. Flanges shall be welded neck or slip-on pattern of class to suit the valves or equipment connections. Flanges shall have machine bolts with hex nuts and washers.

### 3.3 INTERFACE WITH OTHER PRODUCTS

- A. Where it is necessary to run pipes through walls, provide finished, permanent, waterproof installation complete with inserts, sleeves, supports or hangers, seals, and other appurtenances as required. Do not pierce, cut, or notch any footing or other structural member.
- B. Waterproofing and dampproofing of the building shall be unharmed by the installation of the work. Where pipe has to pierce waterproofing or dampproofing, including outside walls, the penetration shall be made watertight. Waterproofing damaged or destroyed shall be repaired or replaced with new waterproofing.

### 3.4 IDENTIFICATION

- A. General: Do not apply identification until insulation and finish painting work is complete.
- B. Equipment:
  - 1. Stencil equipment with minimum two-inch (50-mm) -high letters or provide identification tags. Clearly identify function, equipment served, and area served.
  - 2. Firmly fasten each identification tag to its appropriate piece of equipment with drive screws, sheet metal screws, or rivets. Do not interfere with operation of, or damage the item being marked.
- C. Piping:
  - 1. Mark by stenciling.
  - 2. Mark to identify service with arrows showing direction of flow. Apply markings near building walls where pipes enter or leave an accessible space and in intermediate locations so that markings are no more than 30 feet (9 m) apart. They shall be readily visible to a person standing on the floor.
  - 3. Fully identify all piping installed as work of the project.
  - 4. Mark pipe with letters of height and with colors as required by OSHA and conforming to ANSI

A13.1.

5. Identify every gage, and control device.
6. Provide valve tags for all valves. Numbers shall correspond to those shown on the Valve Chart. Attach tags to valve shaft.

D. Ceiling identification tags: Provide on the access door or, in suspended ceilings, on the ceiling support adjacent to the device.

1. Valves: Identify with the same number shown on the valve tag.

### 3.5 PIPING TESTS

- A. Notify the COR at least one day prior to the actual test.
- B. Test before pipes are concealed or insulated. Test the piping in sections as the work progresses, so as not to delay progress of the building construction. Furnish pumps and gages required for testing.
- C. Conduct piping tests before connecting equipment that would be subject to damage from the test pressure. Replace piping or fittings found defective with new material.
- D. Bracing and supporting: Adequately brace and support piping during the test, so that no movement, displacement, or damage results from the application of the test pressure.
- E. Test the piping systems for not less than four hours to fulfill the conditions in the Piping Systems Test Schedule at the end of this section.
- F. Documentation of tests: Prepare a test report for each portion of piping tested, identified by service, material, location, and pipe size. Include these items:
  1. Date of test.
  2. Starting and completion times.
  3. Initial test pressure.
  4. Final test pressure.
  5. Problems or leaks detected.
  6. Corrective actions taken.
  7. Record of successful completion of testing.
  8. Name, title, and signature of person conducting test.

### 3.6 CLEANING AND PAINTING

- A. Cleaning: Clean piping and equipment. Where items are to be painted, clean and prepare surfaces for painting.
- B. Painting: Paint the items identified below to be painted.
- C. Items to be painted:
  1. Items identified below to have protective coating.
  2. Items furnished with manufacturer's prime coat.
  3. Mechanical rooms:
    - a. Piping.
    - b. Hangers and supports.

4. Fire protection system piping throughout the building.

- D. Items not to be painted: Stainless steel and equipment furnished with manufacturer's finish.
- E. Paint piping in mechanical rooms: Paint piping using colors in accordance with ANSI A13.1 and as coordinated with the owner.
  - 1. Galvanized steel: One coat of primer recommended for galvanized surfaces and one coat of glossy alkyd enamel.
  - 2. Ferrous metal: One coat of primer recommended for ferrous metal and one coat of glossy alkyd enamel.
- F. Paint systems for exposed piping: Primer compatible with the substrate, whether steel, galvanized steel, insulation jacket, or other material; one coat or two, if required to cover, to match adjacent surfaces in color and texture.

3.7 OPERATING INSTRUCTIONS (DEMONSTRATION)

- A. Furnish the necessary technicians, skilled workers, and helpers to operate all the fire-suppression systems and equipment of the entire project for one 8-hour day.
- B. Where specified in technical sections, provide longer periods required for specialized equipment.
- C. Instruct the Government's designated personnel in operation, maintenance, lubrication, and adjustment of all systems and equipment.
  - 1. Instructions by manufacturer's technical representative for each type of system shall include the performance of the recommended preventive maintenance procedures for that equipment.
- D. The Operating and Maintenance Manual shall be available at the time of the instructions, for use by instructors and Government personnel.
- E. Schedule the general and specialized instruction periods for a time agreed upon by the COR.

3.8 SCHEDULES

A. Piping Systems Test Schedule:

SYSTEM	TEST PRESSURE PSIG (kPa)	ALLOWABLE DROP	MEDIUM
Sprinkler water and fire line	200 (1370)	None	Water

END OF SECTION 21 0500

## SECTION 21 1000 - WATER-BASED FIRE-SUPPRESSION SYSTEM

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This section includes the following fire suppression systems inside the building:
  - 1. Wet pipe sprinkler systems.
- B. Related sections include the following:
  - 1. Piping materials and joining requirements: Section 21 0500.
  - 2. Requirements for sleeves, supports, and other items related to piping systems: Division 23.
  - 3. Requirements for firestopping: Division 23.

#### 1.2 DEFINITIONS

- A. AHJ: Authority having jurisdiction, typically the fire marshal.
- B. CPVC: Chlorinated polyvinyl chloride plastic.
- C. CR: Chlorosulfonated polyethylene synthetic rubber.
- D. PE: Polyethylene plastic.
- E. Registered fire protection engineer:
  - 1. Registered professional engineer in District of Columbia (DC).
  - 2. Bachelor's degree in fire protection engineering and no less than two years experience working in fire protection; or Bachelor's degree in engineering and no less than 4 years experience working in fire protection; or other combination of qualifications satisfactory to the AHJ.

#### 1.3 SYSTEM DESCRIPTIONS

- A. Combined standpipe and sprinkler system: Fire-suppression system with both standpipe and sprinkler systems. Sprinkler system is supplied from standpipe system.
- B. Wet pipe sprinkler system: Automatic sprinklers are attached to piping containing water and that is connected to water supply. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device. Hose connections are included if indicated.

#### 1.4 DESIGN REQUIREMENTS

- A. Design the system by the hydraulic calculation method. Base data for calculations are shown on the drawings. Obtain, from the local fire authority having jurisdiction, flow readings from the fire hydrant closest to the project.
- B. Locations of mains and risers, zones, and Hazard Classifications are shown on drawings.

- C. Engage a structural engineer licensed in District of Columbia (DC) to verify conditions and prepare calculations, and to certify that the existing building structural system is adequate to accommodate the new sprinkler system.
- D. Do not include area reductions for quick response sprinklers installed in light or ordinary hazard locations, allowed by NFPA, unless approved by both the insurance carrier and the Government.

#### 1.5 PERFORMANCE REQUIREMENTS

- A. Standard piping system component working pressure: Listed for at least 175 psig (1200 kPa).

#### 1.6 SUBMITTALS

- A. Product data: Include copy of UL report verifying each product's UL listing for Fire Protection Service.
  - 1. Piping materials, including dielectric fittings, flexible connections, and sprinkler specialty fittings.
  - 2. Pipe hangers and supports.
  - 3. Valves, including listed fire protection valves, unlisted general duty valves, and specialty valves and trim.
  - 4. Each type of sprinkler, escutcheon, and guard. Include sprinkler flow characteristics, mounting, finish, and other pertinent data.
  - 5. Monitors.
- B. Shop drawings: Diagram power, signal, and control wiring.
- C. Fire pump/fire hydrant flow test report.
- D. Approved sprinkler piping drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations.
- E. Field test reports and certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13 and NFPA 14. Include "Contractor's Material and Test Certificate for Aboveground Piping."
- F. Welding certificates.
- G. Field quality control test reports.
- H. Operation and maintenance data: For standpipe and sprinkler specialties to include in emergency, operation, and maintenance manuals.

#### 1.7 QUALITY ASSURANCE

- A. Installer qualifications:
  - 1. Installer's responsibilities include designing, fabricating, and installing fire suppression systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.
    - a. Engineering responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer.

- B. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.
- C. NFPA Standards: Fire-suppression-system equipment, specialties, accessories, installation, and testing shall comply with the following:
  - 1. NFPA 13, "Installation of Sprinkler Systems."
  - 2. NFPA 14, "Installation of Standpipe, Private Hydrant, and Hose Systems."
  - 3. NFPA 230, "Fire Protection of Storage."
- D. Pipe shall be certified by the manufacturer to meet referenced standards and shall bear a label directly on the pipe indicating compliance.

#### 1.8 COORDINATION

- A. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

#### 1.9 EXTRA MATERIALS

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

### PART 2 - PRODUCTS

#### 2.1 AVAILABLE MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Available manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to, manufacturers specified.

#### 2.2 ABOVEGROUND PIPE AND FITTINGS

- A. Pipe: Metal, rigid types permitted by NFPA 13, UL listed and FM approved, suitable for specified fittings.
- B. Fittings: Compatible with pipe, types permitted by NFPA 13, UL listed and FM approved.
  - 1. Exceptions: Compression fitting shall be mechanical coupling for grooved pipe only; other compression types are not permitted.
- C. Hangers and supports: UL approved, supporting piping from above, black steel conforming to NFPA 13.

#### 2.3 SPRINKLER SPECIALTY FITTINGS

- A. Drop-nipple fittings: UL 1474, adjustable with threaded inlet and outlet, and seals.

#### 2.4 SPECIALTY VALVES

- A. Sprinkler system control valves: UL listed or FM approved, cast- or ductile-iron body with flanged or grooved ends, and 175-psig (1200-kPa) minimum pressure rating.
- B. Alarm check valves: Equal to Tyco Model AV-1-300 in combination with Model RC-1 retarding chamber, bronze grooved seat with O-ring seals, and trim set for external bypass; clapper assembly mounted in valve body with a hinge pin plug and dual springs.

## 2.5 SPRINKLERS

- A. Sprinklers shall be UL listed or FMG approved, with 175-psig (1200-kPa) minimum pressure rating.
- B. Sprinkler types and categories:
  - 1. Provide quick-response type.
  - 2. Provide high-temperature heat-responsive elements where required.
  - 3. Open sprinklers: UL 199, without heat-responsive element.
    - a. Orifice: 0.5 inch (12.7 mm), with discharge coefficient K between 5.3 and 5.8.
    - b. Orifice: 0.53125 inch (13.5 mm), with discharge coefficient K between 7.4 and 8.2.
  - 4. Extended coverage sprinklers are not acceptable.
- C. Sprinkler types, features, and options as indicated in Part 3.
- D. Sprinkler finishes: White in areas with ceilings, and plain brass in other areas.
- E. Sprinkler escutcheons: White for sidewall and ceiling mounting.

## 2.6 ALARM DEVICES

- A. Alarm device types shall match piping and equipment connections.
- B. Water flow indicator: UL listed, equal to Notifier Corporation Model WFD, electrical-supervision, paddle-operated-type, water-flow detector with 250-psig (1725-kPa) pressure rating and designed for horizontal or vertical installation. Include two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
- C. Valve supervisory switch: UL listed, equal to Notifier Model OSY2, electrical, single-pole, double-throw switch with normally closed contacts. Include design that signals controlled valve is in other than fully open position with tamperproof cover that sends signal when removed.

## 2.7 PRESSURE GAGES

- A. Description: 3.5-inch- (90-mm-) diameter, dial pressure gage with range of 0 to 250 psig (0 to 1725 kPa) minimum.
  - 1. Water system piping: Include caption "WATER" on dial face.

## 2.8 SIGNAGE

- A. Metal signs: Comply with NFPA 13 requirements.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Perform fire hydrant flow test according to NFPA 13, NFPA 14 and NFPA 291. Use results for system design calculations required in Part 1 "Quality Assurance" Article.
- B. Report test results promptly and in writing.

#### 3.2 PIPING APPLICATIONS, GENERAL

- A. Shop weld pipe joints where welded piping is indicated.
- B. Do not use welded joints for galvanized-steel pipe.
- C. Flanges, flanged fittings, unions, nipples, and transition and special fittings with finish and pressure ratings same as or higher than system's pressure rating may be used in aboveground applications, unless otherwise indicated.

#### 3.3 JOINT CONSTRUCTION

- A. Refer to Section 21 0500, Common Work Results for Fire Suppression, for basic piping joint construction.
- B. Threaded joints: Comply with NFPA 13 for pipe thickness and threads. Do not thread pipe with wall thickness less than Schedule 40.
- C. Grooved joints: Assemble joints with listed coupling and gasket, lubricant, and bolts.
  - 1. Ductile iron pipe: Radius cut groove ends of piping. Use grooved end fittings and grooved end pipe couplings.
  - 2. Steel pipe: Square cut or roll groove piping as indicated. Use grooved end fittings and rigid, grooved end pipe couplings, unless otherwise indicated.
  - 3. Copper tube: Roll groove tubing. Use grooved end fittings and grooved end tube couplings.
- D. Dissimilar-metal piping joints: Construct joints using dielectric fittings compatible with both piping materials.
  - 1. NPS 2 (DN 50) and smaller: Use dielectric unions, couplings, or nipples.
  - 2. NPS 2.5 to NPS 4 (DN 65 to DN 100): Use dielectric flanges.
  - 3. NPS 5 (DN 125) and larger: Use dielectric flange insulation kits.

#### 3.4 ABOVEGROUND PIPING INSTALLATION

- A. Install piping above the finished ceiling wherever ceilings occur. For bar joist construction, run the pipes between or threaded through bar joists, arranged so as to give clear path for ductwork, lighting fixtures, and appurtenances below joists and to permit possible clearance for future relocation of light fixtures and ductwork. Consult Finish Schedules on Architectural drawings. Do not install piping so that it blocks access doors or panels of ductwork, air handling equipment, or the space required for filter removal.
  - 1. The finished ceilings shall not be erected until all fire protection piping has been installed, tested, and inspected.



2. Hanger spacing shall conform to NFPA 13.

B. System drains shall be piped to drain into service sinks, drains, or through wall to grade with all exterior fittings of brass. At low points in piping provide ball valves with hose nipples with vacuum breakers.

1. Except as shown otherwise on drawings, drains 1.5 inches and larger shall be piped through wall to grade.

C. Obtain written approval from COR for necessary openings through steel beams for passage of sprinkler pipes. Make openings as small as possible. Where necessary, reinforce the beams around openings with welded steel plates or angle irons in accordance with COR's details or instructions. Perform cutting, welding, and reinforcing as specified in Structural Steel Section of Specifications, including requirements for welders' certification and for inspection and testing. Costs for this inspection shall be paid by the Contractor. Provide certification of each inspection as required in "Submittals" in Part 1 above.

### 3.5 VALVE INSTALLATION

A. Install listed fire-protection valves, specialty valves and trim, controls, and specialties according to NFPA 13 and NFPA 14 and authorities having jurisdiction.

B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire department connections. Install permanent identification signs indicating portion of system controlled by each valve.

C. Install check valve in each water supply connection.

D. Specialty valves:

1. Alarm check valves: Install in vertical position for proper direction of flow, including bypass check valve and retarding chamber drain line connection.

### 3.6 SPRINKLER APPLICATIONS

A. Installation in suspended ceilings:

1. Locate sprinklers in the geometrical centers of acoustical panels or in the geometrical centers of either half of rectangular acoustical panels. Provide pipe, fittings, and number of sprinklers to accomplish this, with no addition to the contract sum.

B. Adjustable recessed pendent: Areas with ceilings.

C. Concealed, including cover plate: Where noted.

### 3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

C. Electrical connections: Power wiring is specified in Division 26.

D. Ground equipment according to Section 26 0526.

- E. Connect wiring according to Section 26 0519.

### 3.8 LABELING AND IDENTIFICATION

- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13 and NFPA 14 and in Section 21 0500.

### 3.9 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:

- 1. Leak test after installation:

- a. Charging medium: water.
    - b. Test pressure and duration of test as required by NFPA 13.
    - c. Repair leaks and retest until no leaks exist.

- 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

- 3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" chapter.

- B. Report test results promptly and in writing to the COR and authorities having jurisdiction.

- C. Grooved pipe installation:

- 1. Install grooved joints in accordance with the manufacturer's latest published installation instructions. Grooved ends shall be clean and free from indentations, projections, and roll marks. Gaskets shall be molded and produced by the coupling manufacturer, and shall be verified as suitable for the intended service.
  - 2. A factory-trained field representative (direct employee) of the mechanical joint manufacture shall provide on-site training for contractor's field personnel in the proper use of grooving tools and installation of grooved piping products. The factory-trained representative shall periodically review the product installation and ensure best practices are being followed. Contractor shall remove and replace any improperly installed products. A distributor's representative is not considered qualified to conduct the training.

### 3.10 CLEANING AND PROTECTION

- A. Clean dirt and debris from sprinklers.
- B. Remove and replace sprinklers with paint other than factory finish.
- C. Protect sprinklers from damage until Substantial Completion.

### 3.11 DEMONSTRATION

- A. Engage a factory authorized service representative to train Government's maintenance personnel to adjust, operate, and maintain specialty valves. Refer to Division 01 and Section 21 0101.

END OF SECTION 21 1000

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## SECTION 23 0100 - OPERATION AND MAINTENANCE OF HVAC SYSTEMS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Service for heating, ventilating, and air conditioning equipment required for the work as indicated on the drawings, including the items listed in "Related Sections".

#### 1.2 RELATED SECTIONS

- A. Operating manuals: Division 01 and Section 23 0101.
- B. General project warranty: General Conditions.
- C. Air terminal units: Section 23 3600.

#### 1.3 DESIGN REQUIREMENTS

- A. The products specified, scheduled, and shown on drawings are the basis of the design of this project.
- B. For requirements affecting use of optional manufacturers, or substitutions, see Division 01 and Section 23 0101, HVAC General Provisions, and Section 23 0500, Common Work Results for HVAC.

#### 1.4 SUBMITTALS

- A. Shop drawings:
  - 1. Proposed service or test agreement of each type included in the project, showing conformance to specifications. Include detailed list of work to be performed at each visit.
- C. Certifications:
  - 1. Each installation and service organization: A list of at least ten projects, similar to this project in type, size, and components, which have been operating satisfactorily for at least two heating and cooling seasons.
  - 2. Include evidence of each requirement specified in the article below for qualifications of each service and maintenance agency.

#### 1.5 QUALITY ASSURANCE

- A. Perform work in accordance with the plumbing, electrical, building, fire and safety codes of the state, county or city in which the work is performed.
- B. UL label and local testing (if required): As specified in Section 23 0500, Common Work Results for HVAC.
- C. HVAC equipment shall meet the energy performance requirements of ASHRAE 90.1 Energy Efficient Design of New Buildings Except Low-rise Residential Buildings.

#### 1.6 QUALIFICATIONS OF EACH SERVICE AND MAINTENANCE AGENCY

- A. Regularly engaged in performing installation, startup, and service work for equipment and systems of the types included in this project.
- B. Located in the Baltimore/Washington, DC, metropolitan area.
- C. Staff factory-trained by the manufacturer of the equipment included in this project.
- D. Provides emergency service on call 24 hours a day.
- E. Maintains an adequate stock of manufacturer's genuine or approved parts to service this equipment.
- F. Has service contracts available, which can meet requirements specified for the equipment and systems of this project.

#### PART 2 - PRODUCTS

Not used.

#### PART 3 - EXECUTION

##### 3.1 IDENTIFICATION

- A. Identify equipment as required in Section 23 0500, Common Work Results for HVAC.
- B. Thermometers, gages, and control devices shall be identified.

##### 3.2 TESTING MECHANICAL EQUIPMENT

- A. Check and adjust all heating and cooling equipment installed.
- B. Operate heating and cooling equipment and check controls including high and low limit controls.
- C. Mechanical equipment shall be proven to function properly by actual operation prior to final acceptance.

##### 3.3 EQUIPMENT LUBRICATION

- A. Bearings of equipment shall be provided with adequate facilities for lubrication. Oiling devices shall be accessible. Lubricate bearings upon completion of work prior to startup of the equipment. Lubricants shall be as specified by equipment manufacturers.

END OF SECTION 23 0100

## SECTION 23 0101 - HVAC GENERAL PROVISIONS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. General provisions and requirements for all HVAC work.

#### 1.2 RELATED SECTIONS

- A. Requirements of this section generally supplement requirements of Division 01.

#### 1.3 REFERENCES

- A. NFPA 10: Portable Fire Extinguishers.
- B. NFPA 241: Safeguarding Construction, Alteration, and Demolition Operations.

#### 1.4 SYSTEM DESCRIPTION

- A. The full set of Contract Documents applies to work of Division 23.
- B. Visit the site and study all aspects of the project and working conditions, as required by General and Supplementary Conditions, Bidding and Contracting Requirements, Drawings, and Specifications. Verify field dimensions.
- C. The work covered in technical sections includes the furnishing of all labor, equipment and materials, and the performance of all operations pertinent to the work described.
- D. Except as required otherwise in Division 01, promptly obtain and pay for, including all necessary signatures and paperwork, all permits, fees and inspections required for work of this division by authorities having jurisdiction, including any utility connection or extension charge. No payment will be made until a copy of the permit is forwarded to the Government.
- E. HVAC work of this project includes, as a brief general description, the following:
  - 1. Demolition of existing HVAC Distribution Systems.
  - 2. Extension of new HVAC Distribution Systems.

#### 1.5 PRODUCT OPTIONS

- A. Except as modified by provisions of Bidding and Contracting Requirements and Division 01, these options apply to Division 23 specifications.
- B. General: Where Contractor is permitted to use a product other than the specified item and model named as the basis of design, Contractor is responsible for all coordination and additional costs as specified in the article "Substitutions," below for substitutions.
- C. Products specified by reference standards or by description only: Any product meeting those standards or description.

- D. Products specified by naming one or more manufacturers, or model name or catalog reference number: Products specified establish a standard of quality, options to be included, and performance, and shall not be construed as limiting competition. Contractor may use products of any manufacturer, which meet the specifications.
- E. Products specified by naming one manufacturer and particular product, with no provision for other options: No options or substitutions allowed.

#### 1.6 SUBSTITUTIONS

- A. Substitutions will be considered only as permitted or required by the Bidding and Contracting Requirements and Division 01. Except as modified by those requirements, the requirements below apply to Division 23 specifications.
- B. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.
- C. Document each request with complete data substantiating compliance of proposed substitution with contract documents.
- D. A request constitutes a representation that the Bidder or Contractor:
  - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
  - 2. Will provide the same warranty for the substitution as for the specified product.
  - 3. Will coordinate installation and make changes to other work which may be required for the work to be complete with no additional cost to the Government.
  - 4. Waives claims for additional costs or time extension which may subsequently become apparent.
  - 5. Will reimburse the Government for review or redesign services associated with re-approval by authorities.
- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitution submittal procedure is specified in Bidding and Contracting Requirements and Division 01.

#### 1.7 MATERIALS AND EQUIPMENT

- A. All materials and equipment shall be new and the best of their respective kinds, suitable for the conditions and duties imposed on them by the project and of representative manufacture. The description, characteristics and requirements of the materials to be used shall be in accordance with the specifications.
- B. All equipment, construction and installation must meet requirements of local, state and federal governing codes.
- C. Singular number: In cases where material, a device, or part of the equipment is referred to in the singular number in the specifications, it is intended that such reference shall apply to as many items of material, devices, or parts of the equipment as are required to complete the installation as shown on the drawings or required for proper operation of the system.

D. Terms have the following meanings:

1. Furnish: Supply item
2. Install: Mount and connect item
3. Provide: Furnish and install.

E. All materials and equipment shall be installed and completed in a first class and workmanlike manner and in accordance with the best modern methods, practice and manufacturers' instructions. Any work which shall not present an orderly and neat or workmanlike appearance shall be removed and replaced with satisfactory work when so directed in writing by the COR.

F. The specifications and drawings are intended to define the minimum requirements, as to quality of materials, construction, finish and overall workmanship.

G. General Conditions describe the correlation and intent of the Contract Documents. In case of discrepancies between the specifications and drawings, the specifications should be followed as to the general methods and principles and the drawings followed as to sizes, capacities and specifics for corresponding parts. If sizes are omitted, the COR will determine sizes to be utilized.

H. In all cases of doubt, uncertainty, or conflict as to the true meaning of the specifications or drawings, it is the responsibility of the Contractor to notify the Architect and COR of said uncertainty, doubt, or conflict and obtain a decision as to the intent before starting any work which may be affected by this decision.

1.8 COORDINATION

A. Should a situation develop during construction to prevent the proper installation of any equipment or item where shown on the drawings, call the situation to the attention of the COR and await a written decision.

B. Plan and coordinate all work to proceed in an orderly and continuous manner without undue delay, and in conformance with project schedule. Submit samples, shop drawings, schedules, insurance policies and certificates, and the like in time to avoid delays in actual construction. Coordinate HVAC work so that work of each trade is completed before other construction begins which would obstruct it.

C. Coordinate trades to ensure that proper clearances between work of the various trades allow access to items which require operation and maintenance.

D. Coordinate location and elevation of all piping, ductwork, light fixtures, equipment, and appurtenances in such a manner that the finished installation is as indicated on drawings. In the event difficulties are encountered which prevent this, it is the Contractor's responsibility to bring this to the attention of the COR prior to initiation of work. Correct improperly coordinated installation at no additional cost.

E. The Contractors' assistants shall include a competent foreman, who shall be on the premises at all times to check, layout, coordinate and superintend the installation of work. The foreman shall establish all grades and lines relative to the work before starting, and be responsible for the accuracy thereof.

1.9 SUBMITTALS

A. Manufacturers' and subcontractors' lists:



1. As specified in Division 01, submit a complete list of proposed manufacturers for all equipment, materials and subcontractors used for the work of this division. Lists shall follow the sequence of the specifications. No considerations will be given for partial or incomplete lists. After review of lists, submit shop drawings and product data.

B. Shop drawings and product data:

1. Submit in accordance with the requirements of Division 01 or as established at the preconstruction conference, the required number of copies of shop drawings and product data for every item of equipment. Shop drawings or product data will not be considered until manufacturers' lists have been approved. Shop drawings and product data shall be submitted, as required by the General Conditions, with sufficient time for checking, return to Contractor, and resubmission as required before Contractor shall install any item.
2. Each item submitted shall be properly labeled, indicating the specific service for which the equipment or material is to be used, section and paragraph number of specification or drawing number to which it applies, Contractor's name and project name and number. Data submitted shall be specific and shall include product data and printed information in sufficient detail and scope to verify compliance with requirements of the contract documents. Clearly identify each item within the data. Data of a general nature will not be accepted. Each sheet must clearly show the project name and number.
3. The review of a shop drawing or product data shall not be considered as a guarantee of the measurements or building conditions or that the shop drawings or product data have been checked to see that item submitted properly fits the building conditions. This review shall not relieve the Contractor of the responsibility for furnishing material or performing work as required by the contract documents, for correctness of dimensions and quantities, or for proper coordination of details and interfaces among trades.
4. All exclusively electrical items furnished as items associated with mechanical items but not specifically described in the mechanical item submission, shall be submitted as a separate submittal but shall be clearly marked as associated with the mechanical item by identification specification paragraph.
5. Product data sheets shall be 8.5-inches by 11-inches cut sheets for operating and maintenance manual.

C. Submit at least three copies of the results of every test required under any section in this division.

D. Specialist shall submit a list of at least three projects similar to this project in type, size, and quality, which have been in place and operating satisfactorily for at least five years.

1. Include project name, address, name and phone number of Government's representative, and project type and size.

E. After the work is completed, submit all required certificates of approval from approved inspection agencies and authorities having jurisdiction over work of this division. Certificates of approval must be received by the COR prior to final acceptance of the work.

#### 1.10 SPECIALIST

- A. The term "Specialist" as used in the specification shall mean an individual or firm of established reputation (or, if newly organized, whose personnel have previously established a reputation in the same field,) which is regularly engaged in, and which maintains a regular force of workers skilled in either (as applicable) manufacturing or fabricating items required by the contract, installing items required by the contract, or otherwise performing work required by the contract. Where the specification requires installation by a specialist, the term shall also be deemed to mean the manufacturer of the item, an individual or firm licensed by the manufacturer, or an individual or

firm who will perform the work under the manufacturer's direct supervision.

#### 1.11 CONTRACT CLOSEOUT SUBMITTALS

##### A. Project record documents:

1. Maintain on site one set of the following record documents; record actual revisions to the work of this division:
  - a. Contract drawings.
  - b. Specifications.
  - c. Addenda.
  - d. Change orders and other modifications to the Contract.
  - e. Reviewed shop drawings, product data, and samples.
2. Maintain record documents separate from documents used for construction.
3. Record information concurrent with construction progress.
4. Specifications: Legibly mark and record in each section a description of actual products installed, including the following:
  - a. Manufacturer's name and product model and number.
  - b. Product options, substitutions, or alternates utilized.
  - c. Changes made by addenda and modifications.
5. Record documents and shop drawings: Legibly mark each item to record actual construction, including:
  - a. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the work.
  - b. Field changes of dimension and detail.
  - c. Details not on original Contract Drawings.
6. Submit documents as specified in Division 01.

##### B. Operation and maintenance data:

1. Submit sets prior to final inspection as specified in Division 01. Unless otherwise specified in Division 01, submit no fewer than three sets. In addition to requirements specified in Division 01, submit operating and maintenance manuals for the work of this division as specified below.
2. Lubrication charts: Prepare lubrication charts for each piece of mechanical equipment that requires grease or oil.
  - a. Include the following:
    - 1) Types of lubricants required.
    - 2) Locations of lubrication points.
    - 3) Frequency of lubrication.
  - b. Provide one extra set of lubrication charts mounted in plastic covers, besides those required in Operating and Maintenance Manuals.
3. Binders: Provide large enough binders, and sufficient quantity, that the required contents can be easily turned, removed, and reinserted.

- a. Self-expanding fast lock type.
  - b. Three telescoping metal posts.
  - c. Durable plastic covers.
  - d. Angle spline with guide flanges.
  - e. Text page size - 8.5 by 11 inches.
  - f. Boorum and Pease, Stock No. C-619-3 expansion 3 inch to 5 inch, or Stock No. C-1219 expansion 1-1/2 inch to 2-1/2 inch, or equal by National or Wilson Jones.
4. Prepare binder covers with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS," and title of project. Print on spine of binder "O & M INSTRUCTIONS." If more than one binder is required, print covers and spines with volume numbers. Include in the front of every binder an index to all binders.
  5. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
  6. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, typed on white paper.
  7. Part 1: Directory, listing names, addresses, and telephone numbers of mechanical engineers; Contractor; mechanical subcontractors; and major mechanical equipment suppliers.
  8. Part 2: Operation and maintenance instructions, arranged by specification section. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify the following:
    - a. Significant design criteria, including performance charts.
    - b. List of equipment, including operating weight of each piece.
    - c. Parts list for each component, including recommended spare parts list.
    - d. Operating instructions.
    - e. Maintenance instructions for equipment and systems.
    - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.
    - g. Valve charts, including locations of flow fittings.
  9. Part 3: Project documents and certificates, including the following:
    - a. Shop drawings and product data.
    - b. Air and water balance reports.
    - c. Photocopies of certificates.
    - d. Photocopies of warranties and guarantees.
    - e. Test reports: Copies of the results of all tests required under all sections of specifications.
  10. Submit one copy of completed volumes in final form 15 days prior to final inspection. This copy will be returned after final inspection, with Engineer comments. Revise content of documents as required prior to final submittal.
  11. Submit final volumes revised, within ten days after final inspection.

#### 1.12 REGULATORY REQUIREMENTS

- A. When these specifications call for materials or construction of a better quality or larger sizes than required by the following codes and standards, the provisions of the specifications shall take precedence.
- B. Provide, without extra charge, any additional materials and labor which may be required for compliance with these codes and standards even though the work is not mentioned in these specifications or shown on the contract drawings.

- C. Perform the work of this division in strict accordance with the following authorities. The latest revision of these codes accepted by the authority having jurisdiction as of the date of the contract documents shall apply.
1. The plumbing, mechanical, electrical, building, fire, and safety codes of the state and county or city in which the work is being performed.
  2. The National Electric Code, NFPA 70 (NEC).
  3. The National Fire Protection Association Code. (NFPA).
  4. International Energy Conservation, Fire, Fuel Gas, Mechanical, and Plumbing Codes (ICC).

#### 1.13 REFERENCE STANDARDS

- A. Perform the work of this division using the standards of the following organizations, as referred to in technical sections, as a minimum requirement for construction and testing. Unless specified otherwise in Bidding and Contract Documents or Division 01, the latest revision current as of the date of the contract documents shall apply. Products shall be certified by manufacturers to meet the requirements of referenced standards.

1. Federal Specifications (FS)
2. Military Specification (MS)
3. Military Standards (Mil. Std.)
4. Air Conditioning and Refrigeration Institute (ARI)
5. Air Movement and Control Association (AMCA)
6. Associated Air Balance Council (AABC)
7. American Association State Highway and Transportation Officials (AASHTO)
8. American National Standards Institute (ANSI)
9. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
10. ASME International (ASME)
11. American Society for Testing and Materials (ASTM)
12. American Society of Sanitary Engineering (ASSE)
13. American Water Works Association (AWWA)
14. International Code Council (ICC)
15. Manufacturer's Standardization Society of the Valve and Fittings Industry Inc. (MSS)
16. National Electrical Code, NFPA 70 (NEC)
17. National Electrical Manufacturer's Association (NEMA)
18. National Fire Protection Association (NFPA)
19. National Fuel Gas Code, NFPA 54
20. National Sanitary Foundation (NSF)
21. National Standard Plumbing Code (NSPC)
22. The Occupational Safety and Health Act (OSHA)
23. Piping and Drainage Institute (PDI)
24. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)
25. Underwriters Laboratory Inc. (UL)
26. Maryland Occupational Safety and Health Act (MOSHA)

#### 1.14 TEMPORARY STORAGE

- A. Maintain upon premises, where directed, a storage area, and be responsible for all contents within these areas. Provide all security measures necessary for this area.
- B. Area shall be maintained and shall be returned to original condition at the completion of the project.

#### 1.15 PROTECTION

- A. Control dust resulting from construction work to prevent its spread beyond the immediate work area, and to avoid creation of a nuisance.
  - 1. Do not use water to control dust. Use drop cloths or other suitable barriers.
  - 2. In areas where dirt or dust is produced as a result of the work, sweep daily, or more often as required.
  - 3. Provide walk-off mats at entries and replace them at regular intervals.
  - 4. Construct dust partitions, where indicated on the drawings or as required.
  - 5. Protect areas occupied by Government personnel or equipment.
  - 6. Seal off all return air registers and other mechanical systems to prevent dust from entering.
- B. Each trade and subcontractor is responsible for preventing damage and soiling of work performed by other trades or subcontractors. Each trade and subcontractor is responsible for providing temporary protection of its own work.
  - 1. Protect work from spills, splatters, drippings, adhesives, bitumens, mortars, paints, plasters, and damage from welding or burning.
  - 2. Protect finished work from damage, defacement, staining, or scratching.
  - 3. Protect finishes from cleaning agents, or grinding and finishing equipment.
  - 4. Protect adjacent and finished work from damage, using tape, masking, covers or coatings and protective enclosures.
  - 5. Coordinate installations and temporarily remove items to avoid damage from finishing work.
- C. Repair all damage or soiling to the complete satisfaction of the COR; replace any materials or work damaged to such an extent that they cannot be restored to their original condition, all at no addition to the Contract Sum.
- D. Protect work stored in place and supplies stored in the building.
  - 1. Store materials and products, subject to damage from moisture, in dry locations. If necessary, protect in wraps or covers.
  - 2. Store plastics, other materials, and products subject to damage from heat or cold at manufacturer's recommended temperatures.
- E. Use of sidewalk or roadway areas outside of the property lines shall be with permission and approval of the local authorities having jurisdiction.

#### 1.16 FIRE PROTECTION

- A. As a minimum, provide hand-carried, portable, UL-rated extinguishers with each work crew working inside the building.
- B. Select extinguishers in accordance with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

#### 1.17 PROJECT CONDITIONS

- A. Drawings showing utilities in concealed locations are based on the best information available but are not represented as being precisely correct. Work of the contract includes digging, cutting, drilling, using nondestructive methods, and other methods of locating concealed utilities in the field, as well as patching and repairing as specified in "Cutting and Patching" below.

B. If, in the course of the work, workers encounter a material they suspect to present some hazard:

1. Promptly notify the COR in writing.
2. Do not perform any work which would disturb the suspected material until written instructions have been received.

#### 1.18 WARRANTY

- A. All work and equipment provided as work of this division shall be fully warranted under the general project warranty. In addition, provide added special warranties specified in individual sections.
- B. During the correction period, the Contractor shall promptly correct any work found to be not in accordance with the requirements of the Contract Documents, on receipt of written notice from the COR. Except as otherwise required in General Conditions and Division 01, the correction period is one year after the date of substantial completion of the work. Work requiring correction shall promptly be repaired or completely replaced at no addition to the Contract Sum.
- C. When use of the permanent equipment has been permitted for temporary heating or ventilation of the building, the warranty and correction periods shall nevertheless begin at the time of substantial completion, unless another date of acceptance has been agreed to by the Government.
- D. Special warranties are warranties required by individual specification sections, incidental product warranties, manufacturers' standard warranties, installer or subcontractor service agreements, and other individual warranties in addition to the general project warranty.
- E. Provide copies of warranties as required for Operation and Maintenance Manual specified above, and by Division 01.
- F. For items of work delayed beyond date of substantial completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

#### PART 2 - PRODUCTS

Not used.

#### PART 3 - EXECUTION

##### 3.1 CUTTING AND PATCHING

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
- B. Cut walls, floors, partitions, roofs, and other appurtenances for the passage or accommodation of pipes, ducts and appurtenances. Close superfluous openings and remove all debris caused by work of this division.
- C. No cutting of any structure or finish shall be done until the condition requiring such cutting has been examined and approved by the COR.
- D. New or existing surfaces disturbed as a result of such cutting or otherwise damaged shall be restored to match original work and all materials used for any patching or mending shall conform to the class of materials originally installed.
- E. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest

intersection or natural break. For an assembly, refinish entire unit.

### 3.2 TEMPORARY FACILITIES

- A. Temporary water facilities, electricity, telephone, toilet facilities, and temporary heat, shall be provided as specified in Division 01.

### 3.3 PROGRESS MEETINGS

- A. Progress meetings shall be held as specified in Division 01, and also when and if the Contractor or COR finds them necessary or advantageous to progress of work.
- B. Contractor, those subcontractors and those material suppliers concerned with current progress or with the scheduling of future progress, and the Government shall each be represented at these meetings by persons familiar with the details of work and authorized to conclude matters relating to work progress.

END OF SECTION 23 0101

## SECTION 23 0500 - COMMON WORK RESULTS FOR HVAC

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Basic material and equipment required for the piping work as indicated on the drawings and specified in Division 23.
- B. Other requirements applicable to more than one section of Division 23.
- C. Identification of HVAC systems and equipment.

#### 1.2 RELATED SECTIONS

- A. Project and special warranties: Division 01 and Section 23 0101.
- B. Operation and Maintenance Manuals: Division 01 and Section 23 0101.

#### 1.3 DEFINITIONS

- A. Project correction period: A period after Substantial Completion of the work during which the Contractor shall correct every part of the work found to be not in accordance with the requirements of the contract documents, promptly after receipt of written notice.
- B. Qualified testing agency: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
  - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
  - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- C. DN: Dimension Nominale, nominal pipe size in millimeters, in accordance with the metric system for construction, Systeme Internationale (SI).
- D. NPS: Nominal pipe size in inches, in accordance with standard U.S. designations for manufactured pipe. Pipe sizes do not change when projects are designed and built in metric units; each size has a consistent name (nominal dimension) in each system.

#### 1.4 DESIGN REQUIREMENTS

- A. The drawings and system performances have been designed based on using the particular manufacturer's products specified and scheduled on the drawings.
- B. Products of other manufacturers that are listed under the article "Available Manufacturers," or permitted as "equal," are permitted provided:
  - 1. Product shall meet the specifications.
  - 2. Contractor shall make, without addition to the contract sum, all adjustments for deviations so that the final installation is complete and functions as the design basis product is intended.



- C. Do not propose products with dimensions or other characteristics different from the design basis product that render their use impractical, or cause functional fit, access, or connection problems.
- D. The contract drawings are generally diagrammatic and do not indicate all fittings or offsets in pipe, all access panels, or other specialties required.
  - 1. Install pipe exposed to view parallel with the lines of the building and as close to walls, columns, and ceilings as may be practical, maintaining proper clearances for access at all parts requiring servicing.
  - 2. Install pipe a sufficient distance from other work to permit a clearance of not less than 0.5 inch (15 mm) between its finished covering and adjacent work.
  - 3. No pipe shall be run below the head of a window or door.
    - a. Equipment, ducts, and pipes installed in areas without a suspended ceiling shall be as tight to structure as possible, but at least above a height of 6'-8", unless otherwise noted.
  - 4. Pull boxes and other appurtenances which require operation or maintenance shall be easily accessible. Do not cut or form handholes for operation or maintenance of appliances through walls or ceilings.

#### 1.5 SUBMITTALS

- A. Shop drawings:
  - 1. Showing proposed expansion design.
  - 2. Schedule of welding and brazing procedures proposed for each piping system included in the project.
- B. Certifications: Proof of operator and testing agency personnel qualifications as required for welding and brazing in the article "Quality Assurance" below.
- C. Test reports: Field test results for each piping system as specified in Part 3 below.

#### 1.6 QUALITY ASSURANCE

- A. Provide materials and perform work in accordance with the plumbing, mechanical, electrical, building, fire, health and safety, and other applicable codes and regulations of the state, county or city in which the work is performed.
- B. Welding procedures and operator qualifications for structural welding: AWS D1.1, Structural Welding Code Steel, electric arc process.
- C. Welding, brazing, and soldering procedures and operator qualifications for building systems piping:
  - 1. AWS D10.9, Qualification of Welding Procedures and Welders for Piping and Tubing.
  - 2. ASME B31.9, Building Services Piping.
  - 3. Copper Development Association "Copper Tube Handbook."
  - 4. Safe Drinking Water Act.
- D. Qualifications of independent testing laboratory personnel:
  - 1. Welding inspectors: AWS QC1, Certification of Welding Inspectors.

- E. Electrical control panels, equipment, materials and devices provided or installed as work of Division 23 shall bear UL label or, if UL label is not available, the item shall be tested and labeled by a qualified testing agency, acceptable to authorities having jurisdiction, and in accordance with NFPA 70 (NEC). Provide testing, if required, without addition to the contract sum.
- F. VOC content: Field-applied adhesives and sealants, limits per South Coast Air Quality Management District (SCAQMD), Rule No. 1168.
- G. Products shall contain no urea-formaldehyde content.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. General piping techniques, testing, identification, painting, and operating instructions specified in this section apply to products specified in other sections of Division 23.
- B. Rust-inhibitive paint: Alkyd based, equal to Benjamin Moore Super Spec HP D.T.M. Alkyd Low Lustre P23; white, black, or bronzetone; applied in a wet film thickness of at least 2.9 mils (0.07 mm).
- C. Weldolets and thredolets: Fittings designed for installing branches on piping, with either welded or threaded connection to branch; conforming to ASTM A 234.
- D. Solder: Free of lead, antimony, and zinc and meeting the requirements of ASTM B 32. No solder containing lead is permitted.
  - 1. Tin 95.5 percent, copper 4 percent, and silver 0.5 percent; equal to "Silvabrite 100" manufactured by Engelhard Corporation.
  - 2. Tin, copper, bismuth, and silver; equal to "Oatey Silver" manufactured by Oatey.
- E. Flux: Meeting the requirements of ASTM B 813 and NSF 61 certified, equal to Oatey H-20<sup>95</sup>.
- F. Pipe jointing compound:
  - 1. Polytetrafluoroethylene (PTFE) pipe thread tape, "Teflon."
  - 2. Pipe cement and oil.

### 2.2 MATERIALS FOR BACKBOARDS FOR PIPING SPECIALTIES

- A. Fiber reinforced plastic (FRP) composite structural shapes: ASTM D 635 and E 84, Pultruded FRP structural shapes, non-corrosive, flame retardant, thermosetting polyester resin, composite factory-fabricated shapes for assorted assemblies and field erection.
  - 1. Ultimate tensile strength: 30,000 psi (207 MPa).
  - 2. Modulus of elasticity:  $2.8 \times 10^6$  psi (19,300 MPa).
  - 3. Specific gravity: 1.6 to 1.75.
  - 4. Density: 0.062 to 0.070 pounds/cubic inch (1.72 to 1.94 grams/cubic centimeter).
  - 5. Flame spread: ASTM E 84 Class A, 25 maximum.
  - 6. Color: Yellow.
  - 7. Shapes and sizes as indicated on the drawings
  - 8. Submit shop drawings of assemblies.
  - 9. Acceptable manufacturers:

- a. Bedford Reinforce Plastics Company
- b. Composites USA, Inc.
- c. Liberty Pultrusions, Inc.
- d. Strongwell Corporation
- e. Structural Fiberglass, Inc.
- f. Or approved equal.

## 2.3 IDENTIFICATION DEVICES AND MATERIALS

- A. Piping color code shall conform to the DC Court's current standard.
  1. Heating water - Purple.
- B. Stenciling materials:
  1. Stencils: Manufactured standard stencils prepared for required applications, conforming to ANSI A13.1 for color and size of legend letters, including arrows showing direction of flow.
  2. Paint: Exterior type enamel, colors conforming to ANSI A13.1, or black.
- C. Equipment identification tags:
  1. Laminated plastic with adhesive back, white core and black outer layers, which, when engraved, will produce white letters and numerals on a black background.
  2. Tags installed on curved surfaces shall be aluminum or brass.
- D. Valve tags: Brass, 1.5 inch (40 mm) in diameter with black-filled numbers not less than 0.25 inch (6 mm) high, complete with brass attachment chains.
- E. Ceiling identification tags: Laminated plastic with adhesive back, engraved black letters on white background, minimum 0.5 inch (15 mm) wide and length as required for 0.375 inch (10 mm) high letters for name of concealed device and number.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF PRODUCTS AND EQUIPMENT

- A. Manufacturers' instructions: Except as modified by drawings or specifications, install products and equipment in accordance with manufacturers' instructions and recommendations applicable to the project conditions.
  1. Immediately notify the COR if a difference or discrepancy is found between manufacturers' instructions and the drawings or specifications.

### 3.2 PIPE INSTALLATION

- A. Remove burrs resulting from cutting pipe or from any other operation.
- B. Threaded connections:
  1. Cut threads full and clean.
  2. Apply specified pipe jointing compound or tape on male threads only.
  3. Where piping is installed in crawl spaces and tunnels, cover exposed threads with either bituminous protective coating or rust-inhibitive paint. Apply after joints have been assembled and tested.

- C. Thoroughly clean pipe and fittings before they are installed, and keep them clean until the acceptance of the completed work. Cap or plug the ends of the lines so as to prevent earth and other debris from entering during construction.
- D. Provide for expansion and contraction of piping and connections so that no strain or breakage will occur. Provide anchors and guides of approved design where shown on drawings and where necessary to allow for proper expansion and contraction. At the time of installation, expansion loops shall be cold sprung to one-half of the calculated expansion.
- E. Provide for draining all parts of water piping systems and apparatus by installing a valved hose connection at every low point.
- F. Black steel piping NPS 2.5 (DN 65) and larger shall be welded; NPS 2 (DN 50) and smaller shall be threaded, except as required otherwise in a particular section.
- G. Do not weld galvanized piping.
- H. Use welding fittings, tees, wyes, reducers, eccentric reducers, and caps as required. Branches at least two nominal pipe sizes less than the main may be made with "Weldolets" or "Thredolets" installed with full size opening in larger pipe and in accordance with manufacturer's printed instructions. Flanges shall be welded neck or slip-on pattern of class to suit the valves or equipment connections. Flanges shall have machine bolts with hex nuts and washers.
- I. Install unions and flanges in the piping at each item of equipment, control valve, and appliance, so as to provide easy removal of the equipment, valve, or appliance, and to provide for easy removal of coils.
- J. Pitch water piping so that air in the system can be properly vented. Provide stop valves where necessary to isolate parts of system for repairs without draining the entire system.
- K. Special techniques: Follow the techniques for soldering and brazing pipe, fittings, and valves as recommended by the manufacturer.

### 3.3 INTERFACE WITH OTHER PRODUCTS

- A. Where it is necessary to run pipes through walls, provide finished, permanent, waterproof installation complete with inserts, sleeves, supports or hangers, seals, and other appurtenances as required. Do not pierce, cut, or notch any footing or other structural member.
- B. Waterproofing and dampproofing of the building shall be unharmed by the installation of the work. Where pipe has to pierce waterproofing or dampproofing, including outside walls, the penetration shall be made watertight. Waterproofing damaged or destroyed shall be repaired or replaced with new waterproofing.

### 3.4 IDENTIFICATION

- A. General: Do not apply identification until insulation and finish painting work is complete.
- B. Equipment:
  - 1. Stencil equipment with minimum two-inch (50-mm) -high letters or provide identification tags. Clearly indicate equipment designation and area served.

2. Firmly fasten each identification tag to its appropriate piece of equipment with drive screws, sheet metal screws, or rivets. Do not interfere with operation of, or damage the item being marked.

C. Piping:

1. Mark by stenciling.
2. Mark to identify service with arrows showing direction of flow. Apply markings near building walls where pipes enter or leave an accessible space and in intermediate locations so that markings are no more than 30 feet (9 m) apart. They shall be readily visible to a person standing on the floor.
3. Fully identify all piping installed as work of the project.
4. Mark pipe with letters of height and with colors as required by OSHA and conforming to ANSI A13.1.
5. Identify every thermometer, gage, and control device.
6. Provide valve tags for all valves except stop valves on individual fixtures or equipment where their function is obvious, or where the fixture or equipment is immediately adjacent. Numbers shall correspond to those shown on the Valve Chart. Attach tags to valve shaft.

- D. Stencil ductwork after insulation is applied, if required, with minimum two-inch (50-mm)-high letters, clearly identifying service (supply, return, exhaust) and showing direction of flow with arrows. Mark ducts near the building walls where they enter or leave a space, and at intervals of not more than 30 feet (9 m). Identification shall be visible to a person standing on the floor.

- E. Ceiling identification tags: Provide on the access door or, in suspended ceilings, on the ceiling support adjacent to the unit.

1. Valves: Identify with the same number shown on the valve tag.
2. Terminal units above ceilings: Identify with unit description and number.

### 3.5 PIPING TESTS

- A. Notify the COR at least one day prior to the actual test.
- B. Test before pipes are concealed or insulated. Test the piping in sections as the work progresses, so as not to delay progress of the building construction. Furnish pumps and gages required for testing.
- C. Conduct piping tests before connecting equipment that would be subject to damage from the test pressure. Replace piping or fittings found defective with new material.
- D. Bracing and supporting: Adequately brace and support piping during the test, so that no movement, displacement, or damage results from the application of the test pressure.
- E. Test the piping systems for not less than four hours to fulfill the conditions in the Piping Systems Test Schedule at the end of this section.
- F. Documentation of tests: Prepare a test report for each portion of piping tested, identified by service, material, location, and pipe size. Include these items:
1. Date of test.
  2. Starting and completion times.
  3. Initial test pressure.
  4. Final test pressure.

5. Problems or leaks detected.
6. Corrective actions taken.
7. Record of successful completion of testing.
8. Name, title, and signature of person conducting test.

### 3.6 CLEANING AND PAINTING

- A. Cleaning: Clean all piping and equipment. Where items are to be painted, clean ready for painting.
- B. Painting: Paint the items identified below to be painted.
- C. Items to be painted:
  1. Items identified below to have protective coating.
  2. Items furnished with manufacturer's prime coat.
  3. Piping and ductwork exposed in finished spaces, insulated and uninsulated.
  4. Inside ducts behind registers, grilles, and diffusers.
- D. Items not to be painted: Copper, stainless steel, and equipment furnished with manufacturer's finish.
- E. Protective coating: Piping, fittings, and hangers shall be protected by one of the following:
  1. Galvanized.
  2. Painted with one priming and one finishing coat of rust-inhibitive paint.
- F. Painting inside ducts behind registers, grilles, and diffusers: Matte black, compatible with substrate and suitable for the temperatures at which the duct will operate, extending from the duct opening to a depth such that no unpainted surface will be visible to a person standing on the floor or adjacent balconies.

### 3.7 OPERATING INSTRUCTIONS (DEMONSTRATION)

- A. Furnish the necessary technicians, skilled workers, and helpers to operate all the HVAC systems and equipment of the entire project for one 8-hour day.
- B. Where specified in technical sections, provide longer periods required for specialized equipment.
- C. Instruct the Government's designated personnel in operation, maintenance, lubrication, and adjustment of all systems and equipment.
  1. Instructions by manufacturer's technical representative for each type of equipment shall include the performance of the recommended preventive maintenance procedures for that equipment.
- D. The Operating and Maintenance Manual shall be available at the time of the instructions, for use by instructors and Government personnel.
- E. Schedule the general and specialized instruction periods for a time agreed upon by the COR.

### 3.8 SCHEDULES

- A. Piping Systems Test Schedule:

SYSTEM	TEST PRESSURE PSIG (kPa)	ALLOWABLE DROP	MEDIUM
Heating water	125 (860)	None	Water

END OF SECTION 23 0500

## SECTION 23 0502 - SLEEVES AND PLATES FOR HVAC PIPING

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Sleeves and escutcheon plates for piping systems.

#### 1.2 SUBMITTALS

- A. Product data: Sleeves, plates, and sealants.

### PART 2 - PRODUCTS

#### 2.1 SLEEVES, PLATES, AND ACCESSORIES

- A. Steel sleeves: Schedule 40 black steel pipe, ASTM A 53.
- B. Copper sleeves: Type L, ASTM B 88 hard drawn.
- C. Cast-iron sleeves: Extra heavy, equal to product of U.S. Pipe Co. with waterstop and ends as shown on the drawings.
- D. Sealing compound in walls and floors: Equal to the following:
  - 1. Bare and insulated pipes carrying fluids 150 degrees F (65 degrees C) and below: Sika Corporation "Sikaflex - la."
  - 2. Bare and insulated piping carrying fluids 151 degrees F (66 degrees C) and above: Dow Corning Corporation "790 Silicone."
- E. Floor, wall and ceiling plates: Stamped or cast brass, hinged type as pipe size requires. Plates shall have chrome finish.

### PART 3 - EXECUTION

#### 3.1 INSTALLING SLEEVES

- A. Install sleeves for piping, or piping with insulation continuous through sleeve, passing through walls, partitions, beams, or slabs.
  - 1. Exception: Where steel pipe penetrates a steel beam that is not part of a fire- or smoke-rated assembly, no sleeve is required.
- B. Do not cut, drill, or burn structural steel for installation of piping without specific instructions from the COR.
- C. Locations in nonfire-rated construction:
  - 1. Install steel sleeves for penetrations of steel, iron, and insulated piping.
- D. Locations in floors and fire-rated construction: Sleeves used in piping penetrations through fire-rated construction shall be an acceptable component of the through-penetration firestop assembly as specified in Section 23 0507, Firestopping for HVAC Work.



1. Where firestop assembly is UL listed, sleeve material shall be as directed in the listing.
  2. Where other specified approval and acceptance is required, sleeve shall be as described in the approved assembly.
- E. Install sleeves through walls and partitions flush with finished surfaces.
- F. Sleeves through floors shall extend 0.375 inch (10 mm) above top of finished floor and be finished neat and level. Sleeves through mechanical or equipment room floors shall extend one inch (25 mm) above finished floor. Provide projecting sleeves with anchor clips to prevent them from being loosened and knocked down in the floor construction.
- G. Sleeves for insulated piping with vapor barrier shall be large enough to pass piping and insulation.
- H. Seal spaces between sleeves and pipe, or pipe insulation, in nonrated walls, with mineral wool.
- 3.2 INSTALLING PLATES
- A. Piping passing through interior walls, partitions, floors, and ceilings in exposed locations shall be fitted with wall, floor, and ceiling plates of size and depth to conceal sleeves. Secure plates firmly in place with set screws.

END OF SECTION 23 0502

## SECTION 23 0503 - ACCESS DOORS FOR HVAC PIPING AND EQUIPMENT

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Access doors for concealed HVAC specialties requiring maintenance or manual operation.

#### 1.2 RELATED SECTIONS

- A. Valves: Section 23 0523.
- B. Specialties: Section 23 0508.
- C. Duct access doors: Section 23 3300.
- D. Controls: Sections 23 0901 through 23 0923.

#### 1.3 SUBMITTALS

- A. Product data: Each type of access door.

### PART 2 - PRODUCTS

#### 2.1 AVAILABLE MANUFACTURERS

- A. Wall and ceiling access doors:
  - 1. Acudor Products Inc.
  - 2. Cesco Products Company
  - 3. Karp Associates, Inc.
  - 4. Milcor, Inc.
  - 5. Zurn Industries
  - 6. Or approved equal.

#### 2.2 WALL AND CEILING ACCESS DOORS

- A. Doors: Provide Milcor model listed, or similar type and equal quality by another acceptable manufacturer.
- B. Types:
  - 1. Fire-rated where occurring in fire-rated walls.
  - 2. Style AP where occurring in acoustical plastered surfaces.
  - 3. Style K where occurring in hard plastered surfaces.
  - 4. Style M stainless steel where occurring in masonry or ceramic tile surfaces.
  - 5. Style DW where occurring in drywall construction.
- C. Sizes: As required for access to the particular device, but no less than 16 by 16 inches (405 by 405 mm).

## 2.3 LABELS

- A. For access doors to fire protection devices: OSHA and NFPA approved, describing the fire protection device within.
- B. Minimum lettering size: 0.5 inch (13 mm) high.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Provide access doors in walls and inaccessible ceilings for concealed damper operators, duct access doors, valves, and other concealed specialties and appliances that require manual operation or maintenance.
- B. Select appropriate size door for each particular application.

END OF SECTION 23 0503

## SECTION 23 0504 - HVAC DEMOLITION

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Extent and location of demolition are shown on the drawings.

#### 1.2 RELATED SECTIONS

- A. Demolition: Division 02.

#### 1.3 QUALITY ASSURANCE

- A. Demolition shall be carried out as expeditiously as possible in accordance with accepted practice and applicable building code provisions.

#### 1.4 PROJECT CONDITIONS

- A. If, in the course of the work, workers encounter a material they suspect to be asbestos, to contain lead or PCBs, or to present some other hazard:
  - 1. Promptly notify the COR in writing.
  - 2. Do not perform any work which would disturb the suspected material until written instructions have been received.
- B. Protect adjacent materials indicated to remain. Install and maintain dust and noise barriers to keep dirt, dust, and noise from being transmitted to adjacent areas. Remove protection and barriers after demolition operations are complete.
- C. Locate, identify, and protect mechanical and electrical services passing through demolition area and serving other areas outside the demolition limits. Maintain services to areas outside demolition limits. When services must be interrupted, install temporary services for affected areas.

### PART 2 - PRODUCTS

Not used.

### PART 3 - EXECUTION

#### 3.1 DEMOLITION

- A. Comply with demolition and disposal requirements of Division 02.
- B. Perform removal work neatly with the least possible disturbance to the building.
- C. Provide temporary barriers, danger signals, and appurtenances for protection of personnel and equipment during removal operations.
- D. Drain and refill portions of existing piping systems necessary to implement the work of this project.
  - 1. Isolation valves shall be installed, if necessary, to keep systems operational in Government-

- occupied portions of the building.
2. Activities for draining systems shall be scheduled and coordinated with the COR in accordance with Division 01 requirements for system shutdowns.
- E. Demolish, remove, demount, and disconnect inactive and obsolete piping, fittings and specialties, equipment, ductwork, controls, fixtures, and insulation.
1. Piping and ducts embedded in floors, walls, and ceilings may be abandoned in place if they do not interfere with new installations. Cut back to at least one inch below finished surface.
  2. Remove materials above accessible ceilings.
  3. Drain and cap items to remain behind finished surfaces.
  4. Patch and repair surface materials as required in Division 01 and Section 23 0101 article, "Cutting and Patching."
- F. Remove anchors, bolts, and fasteners associated with piping and equipment to be removed.

### 3.2 DISPOSAL

- A. Dispose of equipment and materials removed, and rubbish and waste material, as work progresses. Do not allow demolition debris to accumulate on site. Remove products of demolition from the building daily.

### 3.3 PROTECTION

- A. Provide adequate and positive protection to existing building and equipment that is to remain, particularly to prevent entry of either dust or water. Ensure weathertightness at all times. Keep standby patching materials on hand to patch and maintain protection as required.

END OF SECTION 23 0504

## SECTION 23 0508 - HVAC PIPING SPECIALTIES

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Specialties for piping systems.

#### 1.2 RELATED SECTIONS

- A. Piping: Section 23 2113.
- B. Access doors: Section 23 0503.

#### 1.3 SUBMITTALS

- A. Product data: For each specialty included in the work. Include rated capacities of selected equipment and manufacturer's installation instructions where applicable. Indicate materials, finishes, dimensions, required clearances, methods of assembly of components; and piping and wiring connections.

### PART 2 - PRODUCTS

#### 2.1 AVAILABLE MANUFACTURERS

- A. Gaskets:
  - 1. Garlock Mechanical Packing Division
  - 2. Manville
  - 3. Or approved equal.
- B. Dielectric nipples:
  - 1. Anvil International
  - 2. Elster Perfection
  - 3. Precision Plumbing Products, Inc.
  - 4. Sioux Chief Manufacturing Company, Inc.
  - 5. Victaulic Company of America
  - 6. Or approved equal.
- C. Water strainers:
  - 1. Keckley
  - 2. Mueller Steam Specialty
  - 3. Spirax Sarco Inc.
  - 4. Tate Andale, Inc. "Guardian"
  - 5. Watts Industries, Inc.
  - 6. Or approved equal.

#### 2.2 GASKETS, UNIONS, AND DIELECTRIC NIPPLES

- A. Gaskets for flanged joints: Cross-laminated long fiber composition suitable for service, temperature, pressure and liquid with which they come in contact.

- B. Unions NPS 2 (DN 50) and smaller: Malleable iron, Class 150, ASME B16.39, equal to Anvil International with ground bronze seats, or soldered type brass unions of equal quality.
- C. Dielectric nipples:
  - 1. General: Completely isolate dissimilar metals so that electric current is below 1 percent of the galvanic current which would exist with metal-to-metal contact. Gaskets approved for the medium carried by the piping system.
  - 2. Dielectric nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain or threaded ends; and 300-psig (2070-kPa) minimum working pressure at 225 degrees F (107 degrees C).
  - 3. Grooved piping: "Dielectric Waterway Fittings" equal to Victaulic Co. "Clearflow" steel threaded ends or thread to Victaulic groove with opaque, high-temperature thermoplastic copolymer liner designed for use at temperatures up to 225 degrees F (107 degrees C) and pressure up to 300 psi (2068 kPa). Complete with ring groove to lock steel casing to plastic liner.

## 2.3 WATER SPECIALTIES

- A. Y-type strainers:
  - 1. Equal to Spirax Sarco Model IT threaded or Model CI flanged.
  - 2. For use in copper piping: Spirax Sarco Model BT threaded.
  - 3. Screens in Y-type strainers: Stainless-steel having maximum 0.045-inch (1.2-mm) perforations.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Plastic piping specialties are not permitted in HVAC system ceiling plenums or shafts used to convey building HVAC air distribution.

### 3.2 INSTALLING GASKETS, FITTINGS, AND DIELECTRIC NIPPLES

- A. Gaskets shall be installed in accordance with manufacturer's recommendations.
- B. Pipe connections to fixtures, control valves, equipment and appliances shall be provided with unions or flanges so that the units may be disconnected and replaced without damage to the pipe.
- C. Provide dielectric nipples between copper and steel piping NPS 0.5 through 2.5 (DN 15 through 65).

### 3.3 INSTALLING WATER SPECIALTIES

- A. Provide specialties for each piping system and for heat transfer elements, as indicated.
- B. Install valves, Y-type strainers, balancing fittings, vacuum breakers, and appurtenances for heating coils.
- C. A drip pan shall be provided beneath all water specialties, including heating water control valves.

END OF SECTION 23 0508

## SECTION 23 0519 - METERS AND GAGES FOR HVAC PIPING

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Meters and gages for HVAC systems.

#### 1.2 RELATED SECTIONS

- A. Pipe installation and testing: Section 23 0500.
- B. Valve tags and charts: Section 23 0523.

#### 1.3 SUBMITTALS

- A. Shop drawings: Meter and gage schedule showing manufacturer's figure number, scale range, location, and accessories for each meter and gage.
- B. Product data: For each type of meter, gage, device, and fitting specified.
  - 1. Scale range.
  - 2. Ratings.

### PART 2 - PRODUCTS

#### 2.1 AVAILABLE MANUFACTURERS

- A. Pressure-temperature connections:
  - 1. Miljoco Corporation
  - 2. Peterson Equipment Company
  - 3. Sisco
  - 4. Texas Fairfax Company
  - 5. H.O. Trerice Co.
  - 6. Utilities Materials and Controls, Inc.
  - 7. Weiss Instruments
  - 8. Or approved equal.

#### 2.2 PRESSURE GAGES

- A. Gage cock (pressure gage isolation valve):
  - 1. Needle valve: Brass bar stock needle valve, equal to Weksler No. BBV4.

#### 2.3 COMBINATION PRESSURE-TEMPERATURE CONNECTIONS

- A. Combination pressure-temperature connections: Equal to UMAC Universal Lancaster Test Plugs, Peterson "Pete's Plug," Sisco, Fairfax P/T Plugs, H.O. Trerice test plugs, or Miljoco test plugs. Plugs shall have self-closing valve which will operate at a temperature up to 300 degrees F (149 degrees C). Body and cap shall be brass, and shall receive either a temperature or pressure probe. Provide with a kit including gages and thermometers in a protective case.



### PART 3 - EXECUTION

#### 3.1 INSTALLING PRESSURE GAGES

- A. Each gage connection shall have a gage cock. Connections to pipe lines shall be 0.5 inch (DN 15), with 0.5 inch (DN 15) by 0.25 inch (DN 8) reducer for valve, the assembly of sufficient length to clear insulation.
- B. Where gage cocks only are called for on drawings, provide the 0.5-inch (DN 15) connections to pipe line with reducer and the gage cock.

#### 3.2 INSTALLING COMBINATION PRESSURE-TEMPERATURE CONNECTIONS

- A. Option: Provide combination pressure-temperature connections, complete with kits, where thermometer wells or gage cocks only are called for on the drawings.

END OF SECTION 23 0519

## SECTION 23 0523 - GENERAL-DUTY VALVES FOR HVAC PIPING

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Valves for various piping systems.

#### 1.2 RELATED SECTIONS

- A. Piping installation and testing: Section 23 0500.
- B. Piping systems: Section 23 2113.
- C. Access doors: Section 23 0503.

#### 1.3 REFERENCES

- A. ASME B16.10: Face-to-Face and End-to-End Dimensions of Valves.
- B. ASME B16.34: Valves - Flanged, Threaded, and Welding End.

#### 1.4 SUBMITTALS

- A. Product data: For each type of valve. Include body material, valve design, pressure and temperature classification, end connection details, seating materials, trim material and arrangement, dimensions and required clearances, and installation instructions.
- B. Maintenance data: For inclusion in operation and maintenance manual specified in Division 01 and Section 23 0101. Include manufacturer's instructions for adjusting, servicing, disassembling, and repairing.
- C. Valve charts: Furnish valve charts typed on 8.5 by 11-inch (216 by 279-mm) bond paper, showing locations of all manual and automatic control valves, and flow meters. Include:
  - 1. Number
  - 2. Location
  - 3. Service
  - 4. Function
  - 5. Area served
- D. Valve numbering system shall be approved by the Government prior to final submittal. Place one copy of approved chart in a plastic envelope and mount on wall where directed. Provide another copy for each of the Operating and Maintenance Manuals.

#### 1.5 QUALITY ASSURANCE

- A. Ferrous valves shall conform to ASME B16.10 and B16.34 for dimension and design criteria.
- B. Copper alloy valves (brass and bronze) shall have no more than 15 percent zinc in the alloy.

## PART 2 – PRODUCTS

### 2.1 AVAILABLE MANUFACTURERS

- A. Ball valves: Subject to compliance with requirements, provide the specified NIBCO valve, or comparable product by one of the following:
  - 1. Milwaukee Valve Co.
  - 2. NIBCO
  - 3. Or approved equal.
  
- B. Balancing valves: Subject to compliance with requirements, provide specified venturi ball valve (readable) by one of the following:
  - 1. NIBCO
  - 2. Milwaukee Valve Co.
  - 3. Or approved equal.
  
- C. Drain valves: Subject to compliance with requirements, provide the specified NIBCO valve, or comparable product by one of the following:
  - 1. Apollo Valves
  - 2. Milwaukee Valve Co.
  - 3. NIBCO
  - 4. Stockham Valve & Fittings
  - 5. Victaulic Company of America
  - 6. Walworth Co.
  - 7. Watts Regulator Co.
  - 8. Or approved equal.

### 2.2 VALVES

- A. Ball valves:
  - 1. Valves NPS 2 (DN 50) and smaller: Class 150 SWP, bronze, two-piece body, full port, TFE seats and seals, stainless-steel ball and stem. Extension handle for use in insulated piping. NIBCO T-585-70-66, threaded ends.
  
- B. Balancing valves:
  - 1. NPS 2 (DN 50) and smaller: Venturi ball valve (readable valve) with threaded ends.
    - a. Materials: Brass and bronze body, chrome-plated brass ball, PTFE seats and stem packing.
    - b. Ratings: Entire assembly 250 psi, 250 degrees F (1725 kPa, 121 degrees C).
    - c. Flow element: Low-loss, high-signal venturi section with schrader or quick-connect pressure-ports, reliability one to ten and accuracy 2 percent.
    - d. Stem: Blowout-proof.
    - e. Memory stop: On valve section, adjustable, with extended handle.
    - f. Bellows type meter gage kit with case, provide one for use on the entire project.

## 2.3 DRAIN VALVES

- A. Two-piece full-port ball valve, NPS 0.75 (DN 20), 600 psi (4137 kPa) CWP, 400 deg F (204 deg C) maximum operating temperature, bronze body, PTFE seats and seals, chrome-plated brass ball, threaded hose outlet with brass cap and chain, lever handle. Provide extension handle where used in insulated piping. NIBCO T-585-70-HC; threaded inlet.
  - 1. Provide a removable handle where valve is accessible to the general public.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Install valves to be readily accessible for operation and maintenance, and with ample clearance for turning handles or operators.
- B. For valves in inaccessible locations, provide access doors as specified in a related section.
- C. Identify valves as specified in Section 23 0500, Common Work Results for HVAC.
  - 1. Provide tags for all valves except stop valves on individual fixtures or equipment where their function is obvious, or where the fixture or equipment is immediately adjacent. Numbers shall correspond to those shown on the Valve Chart. Attach tags to valve shaft.
  - 2. Provide ceiling identification tags where valves are above an accessible suspended ceiling. Number shall correspond to tag number.

### 3.2 INSTALLING SHUTOFF AND BALANCING VALVES

- A. Install shutoff and balancing valves where indicated. Generally, install balancing valves in return lines of heating coils and elements, and shutoff valves in supply lines.
- B. Shutoff valves for water piping systems shall be as follows:
  - 1. Sizes NPS 2 (DN 50) and smaller: Ball valves.
- C. Balancing valves: Locate valve to provide 5 pipe diameters straight inlet and 2 pipe diameters straight outlet.

### 3.3 INSTALLING DRAIN VALVES

- A. Install drain valves, NPS 0.75 (DN 20) or size indicated on the drawings, at every low point of a water system, and where indicated.

END OF SECTION 23 0523

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## SECTION 23 0529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Supports for piping systems and equipment.
- B. Accessories.

#### 1.2 RELATED SECTIONS

- A. Duct supports: Section 23 3113.

#### 1.3 REFERENCES

- A. ASME B31.9: Building Services Piping.
- B. MSS SP-58: Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation.

#### 1.4 DEFINITIONS

- A. Definitions are from MSS SP-58, "Classification of Piping Systems."
- B. Hot Systems: Maximum operating (service) temperatures 120 degrees F (49 degrees C) and above.
- C. Ambient Systems: Maximum operating temperatures 60 to 119 degrees F (16 to 48 degrees C).
- D. Cold Systems: Maximum operating temperatures 59 degrees F (15 degrees C) and below.

#### 1.5 SUBMITTALS

- A. Product data: Provide manufacturer's literature showing compliance with specifications for each type of hanger and manufactured support, including fasteners and accessory materials.

#### 1.6 QUALITY ASSURANCE

- A. Hangers and supports shall comply with the requirements of:
  - 1. MSS SP-58.
  - 2. ASME B31.9.
- B. Qualifications of welders: As specified in Section 23 0500, Common Work Results for HVAC.

### PART 2 - PRODUCTS

#### 2.1 AVAILABLE MANUFACTURERS

- A. Hangers:
  - 1. Anvil International

2. Carpenter and Paterson, Inc.
3. National Pipe Hanger Corporation
4. PHD Manufacturing, Inc.
5. PHP Systems/Design
6. Or approved equal.

B. Support systems:

1. Anvil International
2. PHD Manufacturing, Inc.
3. PHP Systems/Design
4. Unistrut
5. Or approved equal.

C. Thermal hanger shields:

1. Carpenter and Patterson, Inc.
2. Pipe Shields, Inc.
3. Rilco Manufacturing Co., Inc.
4. Or approved equal.

## 2.2 HANGERS AND SUPPORTS

A. Types are identified by MSS type numbers in the article Installing “Pipe Hangers and Supports” below.

B. Materials for hangers and clamps:

1. For uninsulated steel pipe and all insulated pipe: Galvanized or factory-painted.

C. Insulating-insert materials and protection shields:

1. Insulation-insert material for hot piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig (688-kPa); ASTM C 552, Type II cellular glass with 100-psig (688-kPa); or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig (862-kPa) minimum compressive strength. Insert thickness shall match adjacent piping insulation thickness.
2. Insert and shield shall cover entire circumference of pipe.
3. Insert length: Extend 2 inches (50 mm) beyond shield.

D. Pipe covering protection saddle: Steel, meeting requirements of MSS SP-58 Type 39, with insulating material located in the space between saddle and pipe.

E. Hanger rod nuts and washers shall be zinc-plated. Hanger rods shall be solid steel, all threaded, and zinc-plated.

F. Channel: Slotted cold-rolled steel, equal to Power Engineering Company PS 150 S, 12 gage with 0.406- by 3-inch (10 by 76-mm) slots on 4-inch (102-mm) centers.

G. Wall- and floor-mounted supports: Structural support system equal to Power Engineering Company “Power Strut.”

H. Structural shapes: ASTM A 36.

- I. Steel pipe: ASTM A 53, Grade B, Type E (electric resistance welded), Schedule 40, black and galvanized steel.
- J. Threaded rod: MSS SP-58.

## 2.3 FASTENERS

- A. Fasteners to concrete: Self-drilling type expansion shields or machine bolt drop-in anchors for drilled holes, equal to ITT Phillips Anchors “Red Head.” Fasteners to ceilings shall be vibration and shock resistant. Load applied to fasteners shall not exceed 25 percent of manufacturer’s stated load capacity in 3500 psi (24,000 kPa) concrete.
- B. Fasteners to drywall or cavity wall construction: Equal to ITT Phillips Anchors “Red Head” toggle bolts, with hollow wall drive anchors or nylon anchors as required.
- C. Bolts, nuts, and washers: ASTM A 307, or ASTM A 325 where high strength is required.

## PART 3 - EXECUTION

### 3.1 INSTALLING PIPE HANGERS AND SUPPORTS

- A. Types and locations, refer to MSS SP-58:

Type 1: Clevis hanger:

- 1. Non-steam Hot Systems NPS 0.5 (DN 15) through NPS 8 (DN 200).

Type 9: Adjustable band hanger for piping up to NPS 8 (DN 200) size. Copper-plated for use with copper piping up to NPS 4 (DN 100) size.

Type 18: Malleable iron concrete inserts for supporting hangers from concrete structure.

Type 20: Side beam clamp for attaching hanger rods to structural beams. Use proper size clamp to suit beam flange.

Type 23: C clamp for beams with maximum flange thickness of 0.75 inch (19 mm); for use with single pipes NPS 2 (DN 50) and smaller.

- B. Trapeze piping supports:

- 1. Field-fabricated from ASTM A 36 steel shapes.
- 2. Weld steel according to AWS D-1.1.
- 3. Size threaded rods in accordance with MSS SP-58.
- 4. Design trapeze support assembly based on supported load plus a 50 percent safety factor.

- C. Hanger rod sizes:

(See Schedule, next page)



PIPE SIZE NPS (DN)	ROD SIZE Inches (mm)
Up to 2 (Up to 50)	0.375 (10)
2.5 to 3.5 (65 to 90)	0.5 (15)
4 and 5 (100 to 125)	0.625 (16)
6 and 8 (150 to 200)	0.75 (20)
8 to 12 (200 to 300)	0.875 (22)
14 and over (350 and over)	1.0 (25)

- D. Horizontal piping generally shall be supported from above.
1. Attaching to walls: Use two 0.375-inch (9.5-mm) screw-type fasteners for attaching brackets and three 0.5-inch (13-mm) bolt-type fasteners for attaching structural supports.
  2. Attaching to existing construction: Where necessary to obtain suitable strength for load on concrete slabs or planks, bolt sections of structural channels to slab or planks, using two or more expansion shields as above, and attach hanger rod to the channel.
    - a. Steel joists: Provide structural channels between panel points of at least two joists.
    - b. Concrete slabs: Use expansion shields and steel bolt or rod.
    - c. Precast concrete plank: Use toggle bolts.
  3. Attaching to concrete slab: Secure hanger rods to malleable iron inserts properly spaced and set on the forms before concrete is poured.
  4. Attaching to steel decks: Attach hanger rods to the hanger tabs on underside of deck, or pass them through the steel deck and secure on top side with nut, locknut and plate washer.
    - a. Plate washers: 4 by 8 inches by 0.125 inch thick (100 mm by 200 mm by 6 mm) for 0.375-inch and 0.5-inch (10 mm and 15 mm) rods; 6 by 12 inches by 0.187 inch (150 by 305 by 5 mm) thick for 0.625-inch (16-mm) and larger rods.
    - b. Top of hanger assembly shall be concealed in the concrete fill which will be placed over the deck.
- E. Hangers and supports shall be spaced as follows:
1. Steel pipe:
    - a. NPS 1 (DN 25) and smaller: At least every 6 feet (1.8 m).
    - b. NPS 1.25 and 1.5 (DN 32 and 40): At least every 9 feet (2.7 m).
    - c. NPS 2 to 6 (DN 50 to 150): At least every 10 feet (3 m).
  2. Trapeze hangers:
    - a. Spacing shall not exceed the requirements for the smallest pipe in the rack.
    - b. For wood roof trusses, at least every 6 feet (1.8 m).

- F. Provide additional hangers or supports for concentrated loads such as flanges, valves, expansion compensators, fittings, and other specialties.
- G. Provide hangers as required for insulated piping systems. Coordinate selection of hangers and supports with requirements and selected options for insulation continuous through hanger or butted to each side. Provide pipe covering protection shield and structural insulation insert where insulation is continuous through hangers or supports.
- H. Provide pipe risers through floor slabs with riser clamps.

END OF SECTION 23 0529

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## SECTION 23 0593 - TESTING, ADJUSTING, AND BALANCING

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. The Contractor shall engage and the COR shall approve an independent balancing and testing subcontractor.
- B. This section includes testing, adjusting, and balancing HVAC systems to produce design objectives, including the following:
  - 1. Balancing airflow and water flow within distribution systems, including submains, branches, and terminals, to indicated quantities according to specified tolerances.
  - 2. Adjusting total HVAC systems to provide indicated quantities.
  - 3. Setting quantitative performance of HVAC equipment.
  - 4. Verifying that automatic control devices are functioning properly.
  - 5. Measuring sound and vibration.
  - 6. Reporting results of the activities and procedures specified in this section.

#### 1.2 RELATED SECTIONS

- A. Testing and adjusting requirements unique to particular systems and equipment are included in the sections that specify those systems and equipment.
- B. Field quality-control testing to verify that workmanship quality for system and equipment installation is specified in system and equipment sections.

#### 1.3 PERFORMANCE REQUIREMENTS

- A. Select and obtain approval of the testing and balancing subcontractor at the earliest possible time and before beginning ductwork installation.
- B. The testing and balancing subcontractor shall visit the job site periodically, beginning with the initial stages of construction of the mechanical systems, and shall ensure that the necessary devices are properly installed so that specified testing and balancing can be performed.

#### 1.4 SUBMITTALS

- A. Submit qualifications of testing and balancing subcontractor, as required in article "Quality Assurance" below.
- B. Submit certified balance report. In addition to general requirements for submittals, submit three copies of final reports and certificates, bound into a booklet.
- C. Provide pre- and post-construction TAB reports.

#### 1.5 QUALITY ASSURANCE

- A. Testing and balancing subcontractor qualifications:
  - 1. Current certified member of the Associated Air Balance Council, or certified by National Environmental Balancing Bureau for air and hydronic systems testing and balancing.

2. Has successfully completed at least five projects of similar size and scope.
3. Not affiliated with any other subcontractor participating in this project. Work performed by the subcontractor shall be limited to testing, adjusting, and balancing HVAC systems.

B. Testing and balancing work shall comply with one of the following standards:

1. National Standards for Testing and Balancing Heating, Ventilating and Air Conditioning Systems, published by the Associated Air Balance Council.
2. Procedural Standards for Testing Adjusting Balancing of Environmental Systems, published by the National Environmental Balancing Bureau.

## PART 2 - PRODUCTS

### 2.1 EQUIPMENT

A. Instruments: Approved and properly calibrated.

1. Measure coil pressure differentials with mercury manometers.
2. Measure air temperature with mercury thermometers.
3. Pyrometer surface temperature measurements may be used for piping system water temperatures where thermometer wells are not provided in the piping.

## PART 3 - EXECUTION

### 3.1 VERIFICATION OF CONDITIONS

- A. Before beginning balancing, ascertain that systems are ready.

### 3.2 PREPARATION

- A. Witness air duct leakage tests required in Section 23 3113, Metal Ducts, and advise and approve the methods and instruments used.
- B. Using bench-calibrated instruments, field-calibrate pressure gages and dial-type duct thermometers.

### 3.3 BALANCING OF SYSTEMS, GENERAL

- A. Tabulate settings of temperature control devices and ascertain that thermostats, controllers, and valves are set at specified or approved positions. Verify and certify that the sequence of operation for each system is as shown on drawings, specified, or approved.
- B. Provide all labor and devices necessary for the testing and balancing work.

### 3.4 AIR SYSTEMS BALANCING

- A. Balance all air distribution, supply, return, exhaust, and outdoor air systems and equipment.
- B. Test and adjust fans to deliver design airflow at lowest possible speed. Adjust air-handling equipment to deliver the required air volumes. Note that air quantities scheduled on drawings do not include allowances for duct leakage. Preliminary adjustments of fan speed should be slightly in excess of scheduled airflow delivery. Make adjustments by adjusting adjustable sheaves, changing sheaves and associated belts, changing wiring connections of motors, or adjusting speed controller.

- C. Test and adjust system to design airflow requirements to the greatest extent possible. Manual volume dampers in ducts shall be adjusted to obtain required airflow rates at grilles, registers, and diffusers. Dampers integral to airflow devices should be fully open or minimally closed for airflow fine adjustments.
- D. Make pitot tube traverse of main supply, return, and outdoor air ducts to obtain total airflow for fan or air-handling unit.
- E. Adjust rooms or zones to design airflow (supply, return, and exhaust).
- F. Adjust general HVAC systems to design airflow within the following tolerances:
  - 1. Total system supply, return, and exhaust: (design to plus 10 percent).
  - 2. Total supply, return, and exhaust for a room or space: (minus 5 percent to plus 5 percent).
  - 3. Grilles, registers, and diffusers:
    - a. One per room or space: (minus 5 percent to plus 5 percent).
    - b. Two or more per room or space: (minus 10 percent to plus 10 percent).
- G. Grilles, registers, and diffusers:
  - 1. Identify each grille, register, and diffuser as to location and area. List manufacturer, type, and size.
  - 2. Identify type of testing equipment used.
  - 3. Test and adjust each grille, register, and diffuser to design airflow. List (design-actual) cfm (cubic meters per minute) and (design-actual) velocity in fpm (meters per second) when applicable.
  - 4. Adjust diffusers, grilles, and registers to minimize drafts. Adjust blades in supply diffuser straightening grids to assure uniform air distribution across diffuser.
- H. In cooperation with the control manufacturer's representative, set adjustments of automatically operated dampers to operate as specified.
- I. Adjust air systems feeding terminal reheat units to deliver design airflow with a maximum static pressure at any unit air inlet not over 0.5 inches wg. Eliminate excess static pressure by slowing fan rpm and modulating duct dampers, and not at the reheat unit where excess noise may result.

### 3.5 VARIABLE VOLUME SYSTEM BALANCING

- A. Balance system air distribution, supply, return, and exhaust including air distribution equipment in accordance with AABC standards for Testing and Balancing Variable Volume systems and as specified below.
- B. Balance the secondary duct system and make adjustments to the VAV terminal unit volume regulators. Record the following data:
  - 1. Terminal unit designation.
  - 2. Manufacturer, model number, and size.
  - 3. Minimum primary airflow (design - actual).
  - 4. Maximum primary airflow (design - actual).
- C. Walk through the building and listen for noise generated by the air distribution system. Correct balancing to eliminate excess noise. Report noise not related to balancing.

### 3.6 HYDRONIC SYSTEMS BALANCING

- A. Balance all hydronic piping systems.
- B. Adjust and balance the following items listed under the various systems in accordance with the specified standards.
  - 1. Heating system:
    - a. Reheat coil
- C. After the above items have been adjusted and balanced, submit a certified report listing the specification requirements and the operating conditions of these items as follows:
  - 1. Heating water coil (such as coils in VAV units):
    - a. Flow - gpm
    - b. Entering water temperature
    - c. Leaving water temperature
    - d. Entering air - D.B.
    - e. Leaving air - D.B.

### 3.7 MARKING OF SETTINGS

- A. Following final balance procedures, permanently mark the settings of valves, splitters, dampers, and other adjustment devices so that adjustment can be restored if disturbed at any time. Set memory stops on balancing valves. Return and make required adjustments after submittal and approval of the Certified Balance Report.

END OF SECTION 23 0593

## SECTION 23 0700 - HVAC INSULATION

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Definitions and general requirements applicable to the insulation systems specified in "Related Sections."

#### 1.2 RELATED SECTIONS

- A. Pipe insulation: Section 23 0719.
- B. Duct insulation: Section 23 0713.

#### 1.3 DEFINITIONS

- A. Ceiling space: The space between the ceiling and the floor of an air-conditioned space above.
- B. Roof space: The space between the ceiling and the roof, where building insulation is located at the roof level, or the space between the ceiling and the floor of a non-air conditioned space above.
- C. Attic space: The space between the ceiling and the roof, where building insulation is located at the ceiling level.
- D. Air-conditioned areas or spaces: Areas or spaces where the occupied room temperature is maintained between 65 and 80 degrees F (18.3 and 26.7 degrees C).
- E. Concealed insulation shall include work:
  - 1. Above ceilings.
  - 2. Where furred in and in pipe chases.

#### 1.4 QUALITY ASSURANCE

- A. Perform work in strict accordance with the building, fire and safety codes of the state, county or city in which the work is performed.
- B. Insulation, including fittings and butt strips, jackets, facings, and accessories such as adhesives, mastics, cements, tapes and cloth, shall have a fire and smoke hazard rating and label as tested by ASTM E84, NFPA 255, and UL 723, not exceeding Flame Spread 25, Fuel Contributed 50, Smoke Developed 50.
- C. All insulation and accessories shall be free of asbestos.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver insulation and accessory products in manufacturers' wrapping or cartons, identified on the exterior and bearing labels showing conformance to flame and smoke rating requirements.

### PART 2 - PRODUCTS



2.1 MATERIALS

- A. Refer to sections listed in “Related Sections.”

PART 3 - EXECUTION

Not Used.

END OF SECTION 23 0700

## SECTION 23 0713 - DUCT INSULATION

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Insulation applied to ducts.
- B. Work of this section includes:
  - 1. Insulation for new ductwork installed under this contract.
  - 2. Patching existing insulation where removed to make connections to existing ductwork.
  - 3. Patching existing insulation damaged during demolition and construction.

#### 1.2 RELATED SECTIONS

- A. Painting: Division 09.
- B. Definitions of concealed, exposed, and other terms: Section 23 0700.
- C. Acoustical duct liner: Section 23 3113.

#### 1.3 SUBMITTALS

- A. Material list: Each type of insulation and accessory, with manufacturer's name and material name and number. Identify locations for use, thickness of material, type of jacket, vapor barrier, and method of application.
- B. Product data: Sufficient to show that the product meets the specified requirements for materials, composition, and performance.
- C. Samples required only upon request.

#### 1.4 QUALITY ASSURANCE

- A. Meet requirements specified in Section 23 0700.
- B. Installer qualifications: Firm with at least 5 years successful installation experience with mechanical insulation. Work shall be performed by mechanics skilled in this trade.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Meet requirements specified in Section 23 0700.
- B. Store rigid insulation products so as to protect them from breakage.

### PART 2 - PRODUCTS

#### 2.1 AVAILABLE MANUFACTURERS

- A. The listed manufacturers and particular products are intended to set a standard for materials, composition, and performance. Products of other manufacturers may be proposed as permitted by the provisions of Division 01 and the article "Product Options" in Section 23 0101.

B. Insulation and accessories:

1. Armstrong World Industries.
2. CertainTeed Corporation.
3. Childers.
4. Foster.
5. Johns Manville.
6. Knauf Fiber Glass Gmbh.
7. Owens-Corning.
8. Or approved equal.

2.2 MATERIALS

- A. Flexible mineral fiber insulation: ASTM C 553, Type I, K-factor of 0.27 at 75 degrees F (0.037 at 24 degrees C) mean temperature, of thicknesses specified in Part 3 below, nominal density at least 1 lb per cubic foot (16 kg per cubic meter), with vapor-barrier jacket of reinforced kraft and aluminum foil.
- B. Adhesives for duct insulation inside buildings: Recommended by insulation manufacturer for the application, equal to Foster Products 85-60.
- C. Vapor barrier coating: Equal to Foster 30-65.
- D. Adhesive fasteners: Equal to Duro Dyne or GEMCO perforated base adhesive hanger (PBH). Minimum 12-gauge zinc-plated steel pin with 2 inch by 2 inch, 28 gauge galvanized base and self-locking retaining washer. Pin length as required. Comply with ASTM-A591 and SMACNA HVAC Duct Construction for Mechanical Fasteners. Peel and press (self-sticking) type fasteners are not acceptable.
- E. Self-adhesive tape: Manufacturer's standard tape of material matching insulation jacket, with peelable backing and pressure-sensitive adhesive.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Apply insulation in a neat and workmanlike manner and in accordance with manufacturer's printed instructions. Butt joints tightly and apply a brush coat of adhesive to laps and joint strips. Seal laps, pulling jacketing tight and smooth. Tape joints with self-adhesive tape matching the service jacket.
- B. Tape and seal terminations of insulation to prevent "dusting".

3.2 INSULATION INSIDE BUILDINGS

- A. Concealed ducts: Flexible mineral fiber insulation. On ducts more than 30 inches (762 mm) wide, secure insulation on the underside with mechanical fasteners as required to prevent sagging. Butt insulation with facing overlapping at least 2 inches (50 mm) and sealed with vapor-barrier adhesive. Adhesive must cover full 2-inch (50-mm) overlap to form an airtight seal. Seal breaks and punctures with vapor-barrier tape and vapor barrier coating.
- B. For curved surfaces, such as exposed elbows, score or cut insulating board in narrow strips as necessary for snug and neat fit.

C. Ductwork which need not be insulated:

1. Cooling systems:

a. Lined, insulated flexible supply ducts where installed in:

- (1) Ceiling spaces of air-conditioned spaces.
- (2) Return air plenums, whether ceiling or roof spaces, of air-conditioned spaces.

b. Lined, insulated flexible return ducts, except in attic spaces.

c. Return ducts in ceiling spaces of air-conditioned areas. Note that insulation is required for return ducts in roof spaces.

d. Return duct in return-air ceiling plenums.

2. Heating systems:

a. Lined, insulated flexible supply ducts, except in attic spaces.

3.3 INSULATION THICKNESS

A. Ductwork which transmits combination cooled and heated air or untempered ventilating air shall be insulated as specified below for cooling systems.

B. Cooling systems:

1. Supply air ducts: 1.5 inches (38 mm). Where necessary to conceal the standing seams and reinforcing angles on exposed ducts, 2 inches (50 mm).
2. Return air ducts: 1.5 inches (40 mm). Where necessary to conceal standing seams and reinforcing angles on exposed ducts, 2 inches (50 mm).
3. Transfer ducts shall be insulated as specified for return ducts.

C. Heating systems:

1. Supply air ducts: 1.5 inches (40 mm). Where necessary to conceal the standing seams and reinforcing angles on exposed ducts, 2 inches (50 mm).
2. Return ducts in attic spaces: 2 inches (50 mm).
3. Transfer ducts shall be insulated as specified for return ducts.

D. Casings and headers of reheat coils shall be insulated with the same thickness as adjacent ductwork.

END OF SECTION 23 0713

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## SECTION 23 0719 - HVAC PIPING INSULATION

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. HVAC piping insulation for the piping systems listed in the schedule at the end of this section.
- B. Work of this section includes:
  - 1. Insulation for new piping installed under this contract.
  - 2. Patching existing insulation where removed to make connections to existing piping.
  - 3. Patching existing insulation damaged during demolition and construction.

#### 1.2 RELATED SECTIONS

- A. Definitions and general insulation requirements: Section 23 0700.
- B. Painting: Division 09.
- C. Pipe hangers and protection shields: Section 23 0529.

#### 1.3 REFERENCES

- A. ASTM C 450: Prefabrication and Field Fabrication of Thermal Insulating Fitting Covers for NPS Piping, Vessel Lagging, and Dished Head Segments.
- B. ASTM C 534: Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
- C. ASTM C 547: Mineral Fiber Pipe Insulation.
- D. ASTM C 553: Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

#### 1.4 SUBMITTALS

- A. Schedule of products: Each type of insulation and accessory, with manufacturer's name and material name and number. Identify locations for use, thickness of material, type of jacket, vapor barrier, and method of application.
- B. Product data: Sufficient to show that the product meets the specified requirements for materials, composition, and performance.
- C. Samples required only upon request.

#### 1.5 QUALITY CONTROL SUBMITTALS

- A. Manufacturer's instructions: Recommended accessory materials and products; installation instructions.

## 1.6 QUALITY ASSURANCE

- A. Meet requirements specified in Section 23 0700.
- B. Installers shall be mechanics skilled in this trade.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Meet requirements specified in Section 23 0700.

## PART 2 - PRODUCTS

### 2.1 AVAILABLE MANUFACTURERS

- A. The listed manufacturers and particular products are intended to set a standard for materials, composition, and performance. Products of other manufacturers may be proposed as permitted by the provisions of Division 01 and the article "Product Options" in Section 23 0101.
- B. Mineral fiber insulation:
  - 1. Johns Manville.
  - 2. Knauf Fiber Glass GmbH.
  - 3. Owens-Corning.
  - 4. Or approved equal.
- C. Flexible elastomeric insulation:
  - 1. Armacell LLC
  - 2. Rubatex
  - 3. Or approved equal.
- D. Coatings, adhesives, and fabrics:
  - 1. Childers.
  - 2. Foster.
  - 3. Or approved equal.

### 2.2 MINERAL FIBER PIPE INSULATION

- A. Mineral fiber insulation: Glass fibers bonded with a thermosetting resin.
  - 1. Preformed pipe insulation, ASTM C 547 Type I, with all-service jacket.
- B. All-service jacket (ASJ): Factory-applied, fire-retardant, vapor-barrier foil/scrim/kraft jacket. All-service jacket with self-sealing lap (ASJ-SSL) is acceptable as Contractor's option.
  - 1. Tape: Matching jacket, pressure-sensitive.
- C. Fittings and valves: Prefabricated and field fabricated, meeting ASTM C 450 requirements for dimensions used in forming insulation to cover valves, elbows, tees, and flanges.

### 2.3 FLEXIBLE ELASTOMERIC PIPE INSULATION

- A. Flexible elastomeric tube and sheet: Equal to Armacell “AP Armaflex,” or “Armaflex 2000”, closed-cell, sponge- or expanded-rubber materials, ASTM C 534, Type I (tubular) and Type II (sheet).
- B. Fitting and valve covers: Field fabricated, meeting ASTM C 450 requirements for dimensions used in forming insulation to cover valves, elbows, tees, and flanges.

#### 2.4 ADHESIVES

- A. Joints, fittings, and general application:
  - 1. Fiberglass insulation: Foster “Quick-Tack” 85-60.
  - 2. Flexible elastomeric insulation: Foster “Drion” 85-75.

#### 2.5 MASTICS AND COATINGS

- A. Flexible elastomeric insulation: Armacell “WB Armaflex” latex enamel.
- B. Insulating and finishing cement: Mineral fiber cement with a hydraulic-setting binder, conforming to ASTM C 449.
- C. Vapor barrier coating:
  - 1. On mineral fiber insulation: Foster “Vapor-Fas” 30-65.
  - 2. On flexible elastomeric insulation: Two coats of latex enamel coating.
- D. Finish coating for mineral fiber insulation or lagging: Washable, abrasion-resistant, coating equal to Foster “Sealfas” 30-36.

#### 2.6 FASTENERS

- A. Aluminum bands: 0.75 inches (19 mm) wide and 0.020 inches (0.4 mm) thick.
- B. Staples: Outward clinching type, Type 304 or 316 stainless steel.
- C. Pins: Serrated shaft, Type 304 or 316 stainless steel.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION, GENERAL

- A. Install in accordance with the Minimum Thickness Schedule at the end of this section, as modified by specifications for each location and type.
- B. Mineral fiber insulation: Apply insulation to a neat and smooth finish. Comply with manufacturers’ recommendations and installation instructions. Butt joints tightly and apply a brush coat of vapor barrier coating to each lap and joint strip. Seal or fasten laps in jacketing as specified for location, pulling jacketing tight and smooth. Coat all fittings, valves, and flanges with vapor barrier coating and reinforcing mesh before applying fitting covers.
- C. Flexible elastomeric insulation: Apply by slipping seamless sections of tubing over the end of the piping, wherever possible. Use slit tubing only as necessary. Seal joints and slit seams with joint adhesive.



- 1. Fittings and valves: Field fabricated from insulation same thickness as on the piping. Use manufacturer’s miter tubes and boxes and templates.
- D. Tape and seal with vapor barrier coating to all terminations of insulation.
- E. Staple, tape, or seal plastic pipe fitting covers by methods recommended by manufacturer.
- F. Coordination with pipe hangers and supports:
  - 1. Insulation shall be continuous through hangers for all piping systems. Install pipe covering protection shields with thickness of structural insulation inserts equal, under load, to that of adjoining insulation. Shields and saddle supports are specified in Section 23 0529, Hangers and Supports for HVAC Piping and Equipment.

3.2 INSTALLING INSULATION AT PENETRATIONS

- A. Where the insulated piping systems pass through sleeves or openings in partitions and floors, the insulation shall be continuous through the sleeves and openings. See Firestopping specifications, for coordinating insulation and fire protection sealing.

3.3 INSTALLING HEATING PIPING INSULATION

- A. Piping systems: Heating water
- B. Insulation: Fiberglass pipe insulation with jacket, in accordance with Minimum Thickness Schedule. Staple or seal ASJ laps at Contractor’s option.
- C. Fittings, valves, and covers: Cover with prefabricated fitting covers.
- D. Casings and headers of heating water coils: Fiberglass same thickness as on adjacent piping. Finish with a layer of glass cloth embedded in two coats of lagging coating.
- E. Insulation on strainers: Removable without damage.

3.4 SCHEDULES

- A. Minimum Thickness Schedule: Thicknesses scheduled are for aboveground, interior piping.

MINIMUM THICKNESS SCHEDULE							
PIPE SIZES (NPS)							
Piping System Types	Fluid Temp. Range (Degrees F)	Equipment Connections Up to 1-1/4 (1)	1-1/2 & less	2	3 to 4	5 & 6	8 and larger
Heating water	120-200	1.5	1.5	2.0	2.0	2.0	2.0

(1) - Piping within 2 feet of equipment may be insulated with 1.0-inch flexible elastomeric.

END OF SECTION 23 0719

## SECTION 23 0901 - AUTOMATIC TEMPERATURE CONTROL SYSTEM

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Integration of existing “Automated Logic” automatic temperature control (ATC) system.
- B. Sequence of operation for automatically controlled equipment is shown on drawings. ATC subcontractor shall cooperate with the unit suppliers and provide all relays and wiring required to integrate the sequence of operation.

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

- A. Automatic control valves and insertion wells in piping: For installation under Section 23 2113.
- B. Controls for air terminals specified in Section 23 3600, including damper operator, terminal controller, and velocity controller, each complete with all appurtenances.

#### 1.3 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

- A. Wall thermostats for air terminal units: Section 23 3600.

#### 1.4 RELATED SECTIONS

- A. Controls: Sections 23 0901 through 23 0923.
- B. Balancing: Section 23 0593.

#### 1.5 SYSTEM DESCRIPTION

- A. Provide an extension of existing “Automated Logic” system of direct digital temperature controls with electronic actuation.
- B. The system shall consist of two levels of network communication and wiring, DDC controllers, application-specific controllers, software, operator I/O devices, sensors and other necessary input hardware, dampers, valves, actuators and other necessary output hardware, fire and smoke devices, electrical power surge protection, other necessary equipment and a complete system of wiring to fulfill the intent of the sequences of operation shown on the drawings.

#### 1.6 DESIGN REQUIREMENTS

- A. The products specified, scheduled, and shown on drawings are the basis of the design of this project.
- B. For requirements affecting use of optional manufacturers, or substitutions, see Division 01 and Section 23 0101, HVAC General Provisions, and Section 23 0500, Common Work Results for HVAC.

#### 1.7 SUBMITTALS

- A. Contractor qualifications: Submit a list of a minimum of three projects similar to this project in type, size, and duty, which has been operating satisfactorily for not less than five years.

1. Include project name, address, name and phone number of Government's representative and project size and type.
- B. Shop drawings: Provide a point schedule and composite control diagram of all equipment provided for each control sequence, including factory and field controls. Include a written description of sequences, in which each control device or item of equipment is identified by the designation indicated on the diagram.
- C. Product data: See individual controls sections.
- D. Certifications:
  1. Factory authorization and certification of the installing company.
  2. Evidence of training and certification of each supervisor and mechanic assigned to this project.
- E. Project record documents: As specified in Division 01 and Section 23 0101, provide a drawing at the same scale as the contract drawings, showing the locations of all components installed.

## 1.8 QUALITY ASSURANCE

- A. Subcontractor qualifications: One hundred percent company-owned, full-service, local branch or authorized factory-direct contractor for one of the acceptable national temperature control manufacturing companies named below, as follows:
  1. Full service: Includes system engineering, shop drawing preparation, software programming, installation, commissioning, and service.
  2. Factory-direct contractor: Is contracted directly with manufacturer to buy components and has direct access to manufacturer's local branch office for engineering, service, and technical support without any third-party involvement.
  3. Experience: The branch or factory-direct contractor shall have completed at least three system installations of the same type, size, and design, which have successfully operated their sequence of operations for at least three years.
  4. Supervisors and mechanics: Factory-trained and certified in the type of control system (pneumatic, electric, digital, electronic) being installed, and directly employed by the subcontractor.
    - a. The programmer responsible for programming digital controllers shall have a minimum of three years' experience programming digital controllers of the manufacturer, for HVAC systems.
- B. Qualified subcontractor shall prepare control diagrams.
- C. Perform work in accordance with the plumbing, electrical, building, fire and safety codes of the state, county, or city in which the work is performed.
- D. UL label and local testing (if required): As specified in Section 23 0500, Common Work Results for HVAC.

## PART 2 - PRODUCTS

### 2.1 EXISTING PRODUCT

- A. Electric, electronic, or direct digital system:

- 1. Automated Logic

### PART 3 - EXECUTION

#### 3.1 INSTALLATION, GENERAL

- A. Coordinate with equipment suppliers to integrate controls provided by manufacturers into the control sequences shown on drawings.
- B. Mount devices and control panels provided by equipment manufacturers, and provide required control wiring.
- C. Operate, test, calibrate, and adjust each control system until it operates as intended by the manufacturer and as specified in the control sequence.

#### 3.2 REFURBISHING EXISTING SYSTEM

- A. Adjust existing dampers and free them to operate smoothly. Recondition existing valves to seat properly without leakage.

#### 3.3 TESTS

- A. Thoroughly test and check the completed system to ascertain that all equipment is functioning as intended and that dampers and valves respond properly to their controls. Installer of work of this section shall cooperate with the equipment suppliers, and with balancing and testing work, to make necessary adjustments to ATC devices for proper operation of the completed system.

#### 3.4 OPERATING INSTRUCTIONS

- A. As specified in Section 23 0500, provide operating instructions.
- B. Provide at least eight hours of additional instruction time for the system specified in this section, consisting of two periods of 4 consecutive hours, separated by at least 30 days.

END OF SECTION 23 0901

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## SECTION 23 0902 - CONTROL SYSTEMS WIRING

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Wiring for automatic temperature control system.

#### 1.2 RELATED SECTIONS

- A. Automatic temperature control system: Sections 23 0901 through 23 0923.
- B. Control sequences: Shown on drawings.

#### 1.3 SUBMITTALS

- A. Product data: Wire, cable, conduit and fittings, disconnecting switches, and transformers.

#### 1.4 QUALITY ASSURANCE

- A. UL label and local testing (if required): As specified in Section 23 0500, Common Work Results for HVAC.
- B. ATC circuit shall not supply other building components such as lights or receptacles.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS, GENERAL

- A. Electrical materials and devices shall be UL listed and shall meet the requirements of NEC (NFPA 70) and Division 26, Electrical.

#### 2.2 WIRING

- A. Wiring 50 V and below: Fully color coded, copper 600 V type THW or THHN, minimum No. 22 or as specified in Division 26, Electrical.
- B. Wiring above 50 V: As specified in Section 26 0519, Wires and Cables.

#### 2.3 CONDUIT AND FITTINGS

- A. Galvanized steel conduit: Minimum size 0.5 inch (16 mm) hot-dip galvanized with threads galvanized after cutting, one of the following:
  - 1. Rigid full weight, heavy-wall steel conduit (RGS) conforming to UL 6 and ANSI C80.01.
  - 2. Intermediate steel conduit (IMC) conforming to UL 1242 and ANSI C80.03.
- B. Steel conduit fittings: Cast malleable iron fittings with smooth finish and full threaded hubs. Include steel or malleable iron locknuts, bushings, and other fittings.
  - 1. Insulating bushings: Equal to Thomas & Betts Series 22.
  - 2. Hub fittings with recessed sealing ring and nylon insulated throat equal to Thomas & Betts Series 370.

3. Fittings for exposed locations: Conduit outlet bodies, zinc- or cadmium-plated.
- C. Electrical metallic tubing (EMT): Minimum size 0.5 inch (16 mm), maximum 1.5 inch (41 mm), hot-dip galvanized or sherardized thin-wall steel conduit conforming to UL 797 and ANSI C 80.03.
- D. Connectors and couplings for EMT: Concrete- or rain-tight, compression or set screw type, made of cadmium-plated steel with nylon insulating throat, equal to Thomas & Betts Series 5031, 5123 and 5120.
- E. Flexible metal conduit: Minimum size 0.5 inch (16 mm), made of sheet metal strip, interlocked construction, conforming to UL 1.
- F. Liquidtight flexible metal conduit shall conform to UL 360.
- G. Connectors for flexible metal conduit: Equal to angle wedge "Tite-Bite" with nylon insulated throat, Thomas & Betts Series 3110 and 3130.
- H. Liquidtight connectors: UL 14814A, with fittings and nylon-insulated throat, equal to Thomas & Betts Series 5331.
- I. Surface metal raceway: Equal to Wiremold No. 700 minimum size, complete with fittings, connectors, and accessories.

## 2.4 EQUIPMENT

- A. Control transformer: Designed for power sources for 24-V ac control circuits, and precision built to ensure rated power, proper voltage regulation and maximum efficiency. Units shall be equipped with integral manual reset circuit breaker for over-current protection on the secondary winding. Output regulation shall be 10 percent from no load to full load.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Electrical equipment is specified in Division 26, Electrical. Include in the work of this section relays, pushbuttons, transformers, coils, power wiring, control wiring, or other equipment, meeting requirements of Division 26, so that the automatic temperature control system will function as specified and indicated on the drawings.
- B. Do not use equipment power supply as source for ATC power. Provide a circuit breaker in an electrical panelboard to make ATC connection.
  1. Provide circuit breakers that match and are compatible with the other breakers in the panelboard.
- C. Existing electrical conduits may be reused for new wiring provided they meet the NEC. Use surface metal raceway for exposed wiring in public spaces.
- D. Install conduit and wiring as specified in Sections 26 0519 and 26 0533.
- E. Provide data systems, including outlets, cabling, and required infrastructure, to support the manufacturers' requirements.

- F. Make each run of cable or conductor connecting two points with a single continuous piece of cable or conductor. Do not splice. Cable or conductor may be extended by use of suitable connectors if approved by the COR.
- G. When connecting to electrical wiring of equipment provided with pilot lights, connect to circuit so that pilot light is energized only when equipment is energized.
- H. Provide dedicated 120-V power service to each terminal unit that does not already have electric connections for fan or electric heater.

END OF SECTION 23 0902



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## SECTION 23 0908 - CONTROL VALVES

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Automatic control valves, actuators, and accessories.

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

- A. Control valves: Section 23 2113.

#### 1.3 RELATED SECTIONS

- A. Control system, general: Section 23 0901.
- B. Control sequences: Shown on drawings.

#### 1.4 SUBMITTALS

- A. Product data: Valves, devices, and actuators, each type included in project.

### PART 2 - PRODUCTS

#### 2.1 CONTROL VALVES

- A. Two-way valves shall be sized by the control subcontractor and guaranteed to be of sufficient size to meet the heating or cooling requirements.
- B. With no electric power on the valve actuator, valve shall be in the normal position determined by the application.
  - 1. Unless indicated otherwise, heating system valves are normally open to allow full flow to coils.
- C. Valves NPS 2 (DN 50) and smaller: Equal to Belimo, single-seated globe or union globe type with an equal percentage flow characteristic valve plug, capable of handling water at a maximum 150 psig (1035 kPa), 281 degrees F (138 degrees C). Valves shall have threaded ends.
  - 1. Bodies: Cast brass, rated at 150 psig (1035 kPa).
  - 2. Trim: Brass.
  - 3. Stem: Stainless steel, with replaceable composition disk seat. The stem packing shall be synthetic elastomer U-copper type, utilizing the system pressure to prevent packing leaks.
- D. Maximum pressure drop across water valves shall be 4.0 psi (28 kPa), desired PD equal to 3 psi.

#### 2.2 ELECTRIC VALVE OPERATORS

- A. Low or line voltage electric or electronic motor type with minimum opening and closing time of 15 seconds, sized to provide sufficient power to operate the valve, and for full shutoff against the operating pressure.
- B. Solenoid valves (quick-closing) are not acceptable.

PART 3 - EXECUTION

3.1 INSTALLING VALVES

- A. Install valves complete with operators, as indicated on drawings and as required by control sequences.

END OF SECTION 23 0908

## SECTION 23 0913 - INSTRUMENTATION AND CONTROL DEVICES FOR HVAC

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Control devices and accessories.

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

- A. Wells: Section 23 2113.
- B. Provide controllers and damper actuators to manufacturer of terminal units specified in Section 23 3600, for factory installation.

#### 1.3 RELATED SECTIONS

- A. Automatic temperature control system: Sections 23 0901 through 23 0923.
- B. Sequence of operations: Shown on drawings.

#### 1.4 SUBMITTALS

- A. Shop drawings:
  - 1. Each control device labeled with setting or adjustable range of control.
  - 2. Wiring diagrams. Differentiate between factory-installed and field-installed wiring.
- B. Product data:
  - 1. For each device, indicating dimensions, capacities, performance characteristics, electrical characteristics, finishes, and installation instructions.
  - 2. Each type of accessory. Include finishes.
- C. Maintenance data: As required in Section 23 0101, HVAC General Provisions.

#### 1.5 MAINTENANCE

- A. Provide two sets of manufacturer's special tools for operating tamperproof fasteners, marked to identify their use.
- B. Calibration kit for carbon dioxide sensors: Portable, for field calibration, including nitrogen gas, tubing, regulator, and case, with manufacturer's instructions for performing calibration.
- C. Deliver maintenance products to Government's designated storage area and store as directed.
- D. Maintenance service: On Substantial Completion and building occupancy, calibrate carbon dioxide sensors and instruct Government personnel in the procedure.

## PART 2 - PRODUCTS

### 2.1 CONTROL DEVICES, GENERAL

- A. Coordinate device type and functionality with existing building standard.
- B. Instruments with predetermined temperature or pressure setpoints shall be provided with a means of adjustment over a reasonable range. Adjustable devices for control of temperatures shall be graduated and calibrated in degrees F. Markings such as WARMER and COOLER are not acceptable.
- C. Operating thermostats shall have a low point setting of 45 degrees F.

### 2.2 DIGITAL CONTROLS (ELECTRONIC)

- A. Coordinate control device functionality and type with the existing court's standard.
- B. Equal to Automated Logic Model "ZS Plus": Each room temperature sensor shall include a setpoint adjustment slide, an override switch, and a terminal jack.
  - 1. The setpoint adjustment slide shall allow for modification of the temperature by the occupant. Setpoint adjustment may be locked out, overridden or limited as to time or temperature through software by an authorized operator.
  - 2. The override switch shall initiate override of the night setback mode to normal (day) operation when activated by the occupant. The override function may be locked out, overridden or limited as to the time through software by an authorized operator.
  - 3. The terminal jack shall be used to connect a portable operator's terminal to control and monitor all hardware and software points associated with the controller.
  - 4. Provide controller to accommodate sensor type. Provide room temperature sensors closely matched to the requirements of the associated controllers. Signal input and output shall be accurate, responsive, and silent. The sensor may be either RTD or thermistor type providing the following minimum performance requirements are met:

Accuracy: plus or minus 1 degree F (0.6 degrees C)  
=/- 2% RH, ±5% PPM

Operating range: 35 to 115 degrees F (2 to 46 degrees C)

Set point adjustment range: 55 to 95 degrees F (2 to 30 degrees C)  
10 % - 90% RH, 400 - 1250 PPM

Set point modes: Independent Heating, Cooling, Night Setback-Heating,  
Night Setback-Cooling

Calibration adjustments: None required

Installation: Up to 100 feet from controller

- 5. Capable of sensing temperature, humidity, and CO<sub>2</sub>.
- C. Temperature sensors for air systems shall be RTD type. Sensors shall have a time constant response of less than 3 seconds to a temperature change of 1 degree. Sensors shall be coupled with industrial grade adjustable span transmitters to achieve the following range with the accuracy specified: 10 to 100 degrees F, plus or minus 1 degree F. Sensors shall be suitable for insertion into air ducts and have a minimum insertion of 4 inches.

D. Leak Detection Switch:

1. Point-type leak-detection switches:

- a. Equal to Kele “SD-ROI” spot leak detector.
- b. Features: Single pair of dry contacts for relay output for remote indication.
- c. Alarm activated based on detection of conductive fluid, water.
  - 1) Switch type: SPDT relay.
  - 2) Electric connection: Cable attached.
- d. Construction: Acrylic, ABS plastic switch with polymer coated sensing probes.
- e. Field power: 24-V ac or dc.

2.3 ACCESSORIES

- A. Plastic nameplates: As specified in Section 23 0500, Common Work Results for HVAC, minimum plate size 0.5 by 2.5 inches, minimum letter size 0.1875 inch, properly identifying equipment and use.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Thermostats, temperature sensors, and carbon dioxide sensors. Mount on wall, securely anchored. Mounting height from floor to top of device shall be 48 inches, as required for accessibility to persons using wheelchairs.
- B. Mount wall-mounted devices with tamperproof screws: Where devices are located in new locations, use wall boxes securely anchored flush into the wall. Use copper tubing from ceiling to device either fished through wall cavity or chased into wall and patched to match existing surface. Use Wiremold to run around ceiling for inaccessible ceilings or conceal above accessible ceiling.
- C. Provide manual override on thermostats or temperature sensors as noted in sequence of operation.
- D. Where thermostats or other devices are removed and not replaced, seal ends of wiring and push back into wall.
  - 1. On other surfaces, patch in accordance with requirements of Division 01 and Section 23 0101.

3.2 INSTALLING DIGITAL CONTROLLER

- A. Provide wiring required between digital controller and equipment as scheduled on the Control Point Schedule.
- B. Cooperate with the COR to set up the digital controller to operate as shown in sequence of operations on the drawings.

3.3 ADJUSTING

- A. Calibrate carbon dioxide sensors: Perform zero and span calibrations, following manufacturer's recommended procedures.

3.4 OPERATING INSTRUCTIONS

- A. As specified in Section 23 0500, provide operating instructions.
- B. Instruct Government personnel in use of calibration kit to perform annual calibration of carbon dioxide sensors.

END OF SECTION 23 0913

## SECTION 23 0923 - DIRECT DIGITAL BUILDING SYSTEMS CONTROL

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Direct digital building control (DDC) system.
- B. Network communications.
- C. DDC panels.
- D. System software.
- E. Application-specific controllers.
- F. Operator I/O devices.

#### 1.2 RELATED SECTIONS

- A. Coordination, installer qualifications, and acceptable manufacturers: Section 23 0901.
- B. Automatic temperature control system: Sections 23 0901 through 23 0923.
- C. Control sequences: Shown on drawings.

#### 1.3 SUBMITTALS

- A. Installer qualifications: Submit as required in Section 23 0901, Automatic Temperature Control System. Include, in addition to other requirements, the location of the support facility from which warranty and service will be provided, and a list of the names, titles, and training of the individuals who will be responsible for the work of this project.
- B. Documentation: Submit complete documentation for the system hardware and software, including users' manuals and other support sufficient to enable Government personnel to understand and correctly operate the system. Include this documentation in Operation and Maintenance submittals in accordance with Division 01 and Section 23 0101.
- C. Certifications:
  - 1. Data sheet or copy of government approval form showing that the system complies with FCC Regulations, Part 15, Section 15.
  - 2. Results of functional and diagnostic field tests and calibrations, specified in Part 3. Submit copies of the installing technician's checklist showing that the system has been completely set up and is ready to operate.
  - 3. Submit Compliance Inspection Checklist, initialed and dated, showing satisfactory completion of the installation tests specified in Part 3.

#### 1.4 WARRANTY AND SERVICE



- A. General requirements: Provide all services, materials and equipment necessary for the successful operation and maintenance of the entire DDC system for the period of the general project correction period required by General Conditions, Division 01, and Section 23 0101. Provide parts, software, and labor required for the work. Schedule maintenance and adjustments to minimize effects on facility operations.
- B. The adjustment and repair of the system includes computer equipment, software updates, transmission equipment, and sensors and control devices. Provide the manufacturer's required adjustments and other work necessary to maintain system operation.
- C. Personnel: Provide qualified personnel to accomplish work promptly and satisfactorily. Notify the COR in writing of the name of the designated service representative, and of changes in personnel.
- D. Schedule of work: Schedule major inspections in June and December and minor inspections in March and September. Minor inspections shall include visual checks and operational tests of each item of equipment. Major inspections shall include all work described for minor inspections and the following work:
  - 1. Clean equipment, including interior and exterior surfaces.
  - 2. Perform signal, voltage, and system isolation checks of system workstations and peripherals.
  - 3. Check and calibrate each field device. Check all analog points and digital points.
  - 4. Run diagnostics and correct diagnosed problems.
  - 5. Resolve and correct other observable problems.
- E. Emergency service: Qualified personnel shall be available to provide service to the complete system. Furnish the Government with a telephone number where service representative can be reached at all times. Service personnel shall be at the site within 8 hours after receiving a request for service, and shall restore the control system to proper operating condition within 24 hours.
- F. Operation: Performance of scheduled adjustments and repair shall verify operation of the system as demonstrated by the initial performance test.
- G. System modifications: Make recommendations for system modification in writing to the COR. Do not make any system modifications, including operating parameters and control settings, without prior written approval of the COR. Modifications to the system shall be incorporated into the operations and maintenance manuals and other documentation.
- H. Software: During the project correction period, provide all software updates and verify operation in the system in a timely manner. Instruct the system operators, and incorporate updates into the operations and maintenance manuals and software documentation. At the end of the correction period, continue to notify the Government of software revisions.

## PART 2 - PRODUCTS

### 2.1 GENERAL PRODUCT DESCRIPTION

- A. The DDC system shall integrate multiple building functions including equipment supervision and control, alarm management, energy management, and historical data collection.
- B. The building control system shall include the following:
  - 1. Network DDC panels
  - 2. Network application-specific controllers (ASCs)
  - 3. Portable operator's terminals

4. Personal computer operator workstation(s)
- C. The system shall be modular and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, DDC panels, application-specific controllers, and operator devices.
- D. System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution. Each DDC panel shall operate independently by performing its own specified control, alarm management, operator I/O, and data collection. The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.
- E. Without depending on a control processing device, DDC panels shall be able to:
  1. Access any data from or send control commands and alarm reports directly to any other DDC panels or combination of panels on the network.
  2. Send alarm reports to multiple operator workstations.

## 2.2 NETWORKING COMMUNICATIONS

- A. The DDC system shall network operator workstations.
  1. A high performance peer-to-peer network.
  2. An application-specific local area network (LAN).
- B. Peer-to-peer network level:
  1. Operator workstations and DDC panels shall directly reside on a network such that communications shall be executed directly between DDC panels, directly between workstations, and between DDC panels and workstations on a peer-to-peer basis.
  2. Inherent in the system's design shall be the ability to expand or modify the network either via a LAN, or auto-dial telephone line modem connections, or via a combination of the two networking schemes.
  3. All operator devices, either network-resident or connected via 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 peer-to-peer network. Access to data shall be based on logical identification of building equipment. No hardware or software limits shall be imposed on the number of devices with global access to the network data.
  4. Network design shall include the following provisions:
    - a. Provide high-speed data transfer rates for alarm reporting, quick report generation from multiple controllers and upload/download efficiency between network devices. An alarm occurring at any DDC panel shall display at one or more workstations or alarm printers within 5 seconds.
    - b. Support of any combination of DDC panels and operator workstations directly connected to the peer-to-peer network. The network shall support a minimum of 32 devices.
    - c. Message and alarm buffering to prevent information from being lost.
    - d. Error detection, correction, and retransmission to guarantee data integrity.
    - e. Synchronization of real-time clocks, to include automatic daylight savings time updating among all DDC panels.
    - f. Commonly available, multiple source, networking components and protocols shall be used to allow the DDC system to coexist with other networking applications such as office automation. ETHERNET and ARCNET are acceptable technologies.

- 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.
- C. Application-specific local area network (LAN):
1. This level communication shall support a family of application-specific controllers and shall communicate bidirectionally with the peer-to-peer network through DDC panels for transmission of global data.
  2. Application-specific controllers shall be arranged on the LANs in a functional relationship with DDC panels. For example, a VAV terminal unit controller shall be on a LAN from the DDC panel that is controlling its corresponding AHU.
  3. A maximum of 32 application-specific controllers may be configured on each LAN.
- D. Communication capability:
1. Automatic communications shall allow DDC panels to communicate with remote operator stations and remote terminals, as indicated in the sequence of operations.
  2. DDC panels shall automatically communicate with workstations to report alarms or other significant events.
  3. Operators at the 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 network. Routines shall automatically answer communications from remote DDC panels. The fact that communications are taking place with remote DDC panels shall be invisible to an operator.

### 2.3 DDC PANEL

- A. Microprocessor-based panels with a minimum word size of 16 bits: Multi-tasking, multi-user, real-time digital control processors consisting of modular hardware with plug-in enclosed processors, communication controllers, power supplies and input/output point modules. Each DDC panel shall be capable of operating as a stand-alone controller, performing its specified control functions independently of other controllers in the network. Controller size shall be sufficient to fully meet the requirements of this specification and the point list on the drawings.
- B. Each DDC controller shall have sufficient memory, a minimum of 1 megabyte, to support its own operating system and databases, including:
1. Control processes
  2. Energy management applications
  3. Alarm management applications
  4. Historical and trend data for points specified
  5. Maintenance support applications
  6. Custom processes
  7. Operator I/O
  8. Communications
  9. Manual override monitoring
- C. Each DDC panel shall support:
1. Monitoring of the following types of inputs, without the addition of equipment outside the DDC panel:
    - a. Analog inputs

- (1) 4-20 mA
      - (2) 0-10 Vdc
      - (3) Thermistors
      - (4) 1000-ohm RTDs
    - b. Digital inputs
      - (1) Dry contact closure
      - (2) Pulse accumulator
      - (3) Voltage sensing
  2. Direct control of electronic actuators and control devices. Each DDC panel shall be capable of providing the following control outputs without the addition of equipment outside the DDC panel:
    - a. Digital outputs
      - (1) Contact closure (motor starters, sizes 1-4)
    - b. Analog outputs
      - (1) 0-20 psi
      - (2) 4-20 mA
      - (3) 0-10 Vdc
- D. Additional space for future point connections, each DDC panel: Minimum 10 percent.
1. Provide sufficient internal memory for the specified control sequences with at least 25 percent of the total memory available for future use.
- E. Each DDC panel shall have at least two RS-232C serial data communication ports for operation of operator I/O devices.
- F. Each DDC panel shall have point discrete, on-board, limited access Hand/Off/Auto operator override switches for digital control type points and gradual switches for analog control type points. These override switches shall be operable whether the panel processor is operational or not. DDC panels shall monitor the status of all overrides and remotely report each override control operation.
- G. DDC panels shall provide local LED status indication for each digital input and output for constant, up-to-date verification of all point conditions without the need for an operator I/O device. Graduated intensity LEDs or analog indication of value shall also be provided for each analog output. Status indication shall be visible without opening the panel door.
- H. Each DDC panel shall continuously perform self-diagnostics, communication diagnosis, and diagnosis of all panel components, and provide both local and remote annunciation of detected component failures, low battery conditions, or repeated failure to establish communication.
- I. Provide isolation at each peer-to-peer network termination and each field point termination, to suppress induced voltage transients, meeting requirements of IEEE C62.41.
- J. In the event of the loss of normal power, each DDC panel shall shut down in an orderly process which shall prevent the loss of database or operating system software. Provide nonvolatile

memory for critical controller configuration data and battery backup sufficient to support the real-time clock and volatile memory for a minimum of 72 hours.

1. Upon restoration of normal power, the DDC panel shall automatically resume full operation without manual intervention.
  2. Should DDC panel memory be lost for any reason, reloading the DDC panel shall be possible via the local RS-232C port, via telephone line dial-in, or from an operator workstation.
- K. Provide a DDC panel for each AHU or other HVAC system as indicated on the drawings. It is intended that each unique system be provided with its own point-resident DDC panel.

## 2.4 SYSTEM SOFTWARE

### A. General:

1. Provide all necessary software to form a complete control system as described in this specification.
2. The software programs specified in this section shall be integral in DDC panels and shall not be dependent upon any higher-level computer for execution.

### B. Control software:

1. The DDC 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. Control loop tuning
2. Include a provision for limiting the number of times each piece of equipment may be cycled within any one-hour period.
3. Shall protect against excessive demand during start-up periods by automatically introducing time delays between successive start commands to heavy electrical loads.
4. Upon the resumption of normal power, the control software shall analyze the status of controlled equipment, compare it with normal occupancy scheduling, and turn equipment on or off as necessary to resume normal operations.

### C. DDC panels shall be able 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. Start-stop time optimization
6. Automatic Daylight Savings Time switchover
7. Night setback control
8. Enthalpy switchover (economizer)
9. Peak demand limiting
10. Temperature-compensated duty cycling
11. Fan speed/CFM control
12. Heating/cooling interlock

- a. All programs shall be executed automatically without the need for operator intervention and shall be flexible enough to allow user customization. Programs shall be applied to building equipment as described in the control sequences.
- D. DDC panels shall be able to execute custom, job-specific processes defined by the user, to automatically perform calculations and special control routines.
1. It shall be possible to use any of the following in a custom process:
    - a. Any system measured point data or status
    - b. Any calculated data
    - c. Any results from other processes
    - d. User-defined constants
    - e. Arithmetic functions (+, -, \*, /, square root, exp, etc.)
    - f. Boolean logic operators (and/or, exclusive or, etc.)
    - g. On-delay/off-delay/one-shot timers
  2. Custom processes may be triggered based on any combination of the following:
    - a. Time interval
    - b. Time of day
    - c. Date
    - d. Other processes
    - e. Time programming
    - f. Events (e.g., point alarms)
  3. The custom control programming feature shall be documented in English.
- E. Alarm management shall monitor and direct alarm information to operator devices. Each DDC panel shall perform distributed, independent alarm analysis and filtering to minimize operator interruptions due to noncritical alarms, minimize network traffic, and prevent alarms from being lost. At no time shall the DDC panel's ability to report alarms be affected by operation of a PC workstation or local I/O device, or by communications among panels on the network.
1. All alarm or point change reports shall include the point's English language description and the time and date of occurrence.
  2. The user shall be able to define the specific system response to alarm at each point. Alarms shall be prioritized. Each DDC panel shall automatically inhibit the reporting of selected alarms during system shutdown and start-up. Users shall have the ability to manually inhibit alarm reporting for each point.
  3. Alarm reports and messages shall be directed to a user-defined list of operator devices.
  4. In addition to the point's descriptor and the time and date, the user shall be able to print, display, or store an alarm message to more fully describe the alarm condition or direct operator response.
  5. Operator-selected alarms shall initiate a call to a remote operator device.
- F. A variety of historical data collection utilities shall manually or automatically sample, store, and display system data for points as specified in the I/O summary.
1. DDC panels shall store and report point history data for selected analog and digital inputs and outputs. Methods of collection shall be either by a predefined time interval or upon a predefined change of value.
  2. DDC panels shall provide high resolution sampling for verification of control loop performance. Operator-initiated automatic and manual loop tuning algorithms shall be provided for

operator-selected PID control loops as identified in the point I/O summary. Provide capability to view or print trend and tuning reports.

- G. DDC panels shall automatically accumulate and store run-time hours for digital input and output points as specified in the point I/O summary.
- H. DDC panels shall automatically sample, calculate, and store consumption totals on a daily, weekly or monthly basis for user-selected analog and digital pulse input type points as specified in the point I/O summary.
- I. DDC panels shall have the ability to count events such as the number of times a pump or fan system is cycled on and off. Event totalization shall be performed on a daily, weekly, or monthly basis for points as specified in the point I/O summary.

## 2.5 APPLICATION-SPECIFIC CONTROLLERS (ASC)

- A. Each DDC panel 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 stand-alone 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. Terminal equipment controllers:
  - 1. System shall control each piece of equipment through direct connection to a DDC or ASC. Terminal equipment shall include, but not be limited to, the following:
    - a. Variable-air-volume (VAV ) terminal units
  - 2. Controllers shall include all point inputs and outputs necessary to perform the specified control sequences. As a minimum, 50 percent of the point outputs (except for unit ventilator controllers) shall be of the universal type, either modulating or two-position. Terminal equipment controllers utilizing proprietary control signals and actuators shall not be acceptable. Provide DDC panels or ASCs with industry standard outputs for control of terminal equipment.
  - 3. Each controller shall perform its primary control function independent of other DDC panel LAN communication, or if LAN communication is interrupted. The controller shall receive its real-time data from the DDC panel time clock and shall ensure LAN continuity. Each controller shall include algorithms incorporating proportional, integral, and derivative (PID) gains for all applications. All PID gains and biases shall be field-adjustable by the user via terminals as specified herein.
  - 4. Provide each terminal equipment controller with sufficient memory to accommodate point databases, operating programs, local alarming and local trending. All databases and programs shall be stored in nonvolatile EEPROM, EPROM and PROM, or minimum of 72-hour battery backup shall be provided. The controllers shall be able to return to full normal operation without user intervention after a power failure of unlimited duration. Operating programs shall be field-selectable for specific applications. Specific applications may be modified to meet the user's exact control strategy requirements, allowing for additional system flexibility. Controllers that require factory changes of applications are not acceptable.
  - 5. Variable-air-volume (VAV) terminal controllers shall support the following types of pressure independent terminal units as a minimum:
    - a. VAV with hot water heating coil

## 2.6 PORTABLE OPERATOR'S TERMINAL (POT)

- A. Provide portable operator terminals with a minimum LCD display of 80 characters by 25 lines and a full-featured keyboard. The POT shall be handheld and plug directly into individual distributed control panels as described below. Provide a user-friendly, English-language-prompted interface, not codes requiring look-up charts.
- B. Functions of the POT connected at any DDC controller:
  - 1. Access all DDC panels on the network.
  - 2. Backup and restore DDC controller data bases for all system panels, not just the DDC Controller connected to.
  - 3. Display all point, selected point and alarm point summaries.
  - 4. Display trending and totalization information.
  - 5. Add, modify, or delete any existing or new system point.
  - 6. Command, change setpoint, enable or disable any system point.
  - 7. Program and load custom control sequences as well as standard energy management programs.
- C. Functions of the portable operator's terminal connected to any application-specific controller:
  - 1. Provide connection capability at either the ASC or a related room sensor to access controller information.
  - 2. Provide status, setup, and control reports.
  - 3. Modify, select, and store controller data base.
  - 4. Command, change setpoint, enable or disable any controller point.

## 2.7 OPERATOR WORKSTATION SOFTWARE

- A. Basic interface description:
  - 1. Operator workstation interface software shall use English-language prompting, English-language point identification, and industry standard PC application software. The software shall provide, as a minimum, the following functions.
    - a. Graphical viewing and control of environment.
    - b. Scheduling and override of building operations.
    - c. Collection and analysis of historical data.
    - d. Definition and construction of dynamic color graphic displays.
    - e. Editing, programming, storage, and downloading of controller databases.
  - 2. Provide a graphical user interface which shall use a mouse or similar pointing device and "point and click" approach to menu selection. Users shall be able to start and stop equipment or change setpoints from graphical displays with the pointing device.
    - a. Provide that all operations can also be performed using the keyboard as a backup interface device.
    - b. Provide at least 10 special function keys to perform often-used operations.
  - 3. The software shall provide multi-tasking that allows the user to run several applications simultaneously. The mouse shall be used to quickly select and switch between multiple applications. This shall be accomplished through the use of Microsoft Windows or similar



- industry standard software that supports concurrent viewing and controlling of systems operations.
4. Multiple-level password access protection shall be provided to allow the user manager to limit workstation control, display, and data base manipulation capabilities.
  5. Software shall allow the operator to perform commands including, but not limited to, the following:
    - a. Start up or shut down selected equipment
    - b. Adjust setpoints
    - c. Add/modify/delete time programming
    - d. Enable/disable process execution
    - e. Lock/unlock alarm reporting for points
    - f. Enable/disable totalization for points
    - g. Enable/disable trending for points
    - h. Override PID loop setpoints
    - i. Enter temporary override schedules
    - j. Define holiday schedules
    - k. Change time/date
    - l. Automatic daylight savings time adjustments
    - m. Enter/modify analog alarm limits
    - n. Enter/modify analog warning limits
    - o. View limits
    - p. Enable/disable demand limiting for each meter
    - q. Enable/disable duty cycle for each load
  6. Reports shall be generated and directed to either CRT displays, printers, or disk. As a minimum, the system shall allow the user to easily obtain the following types of reports:
    - a. A general listing of all points in the network
    - b. List of all points currently in alarm
    - c. List of all points currently in override status
    - d. List of all disabled points
    - e. List of all points currently locked out
    - f. DDC controller trend overflow warning
    - g. List all weekly schedules
    - h. List of holiday programming
    - i. List of limits and deadbands

**B. Scheduling:**

1. Provide a graphical spreadsheet-type format for time-of-day scheduling and overrides of building operations. Provide the following spreadsheet graphic types as a minimum:
  - a. Weekly schedules
  - b. Zone schedules
  - c. Monthly calendars
2. Weekly schedules shall be provided for each building zone or piece of equipment with a specific occupancy schedule. Each schedule shall include columns for each day of the week as well as holiday and special day columns for alternate scheduling on user-defined days. Equipment scheduling shall be accomplished by simply inserting occupied and unoccupied times into appropriate information blocks on the graphic. In addition, temporary overrides and associated times may be inserted into blocks for modified operating schedules. After overrides have been executed, the original schedule will automatically be restored.

3. Provide zone schedule for each building zone. Each schedule shall include all commandable points residing within the zone. Each point may have a unique schedule of operation relative to the zone's occupancy schedule, allowing for sequential starting and control of equipment within the zone. Scheduling and rescheduling of points may be accomplished easily via the zone schedule graphic.
4. Monthly calendars for a 24-month period shall allow scheduling of holidays and special days in advance. Holidays and special days shall be user-selected with the pointing device and shall automatically reschedule equipment operation as previously defined on the weekly schedules.

C. Collection and analysis of historical data:

1. Trending capabilities shall allow the user to easily monitor and preserve records of system activity over an extended period of time. Any system point may be trended automatically at time-based intervals or changes of value, both of which shall be user-definable. Trend data may be stored on hard disk for future diagnostics and reporting.
2. Trend data report graphics shall allow the user to view all trended point data. Reports may be customized to include individual points or predefined groups of at least 6 points. Provide additional functionality to allow any trended data to be transferred easily to an off-the-shelf spreadsheet package. This shall allow the user to perform custom calculations such as energy use, equipment efficiency, and energy costs and shall allow for generation of these reports on high-quality plots, graphs, and charts.

D. Dynamic color graphic displays:

1. Color graphic floor plan displays and system schematics for each piece of mechanical equipment, including air-handling units, chilled water systems and hot water boiler systems, shall be provided as indicated in the point I/O summary to optimize system performance analysis and speed alarm recognition.
2. 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.
3. 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.
4. The environment of the PC operator workstation shall allow the user to simultaneously view several graphics at a 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.
5. Graphic generation software shall allow the user to add, modify, or delete system graphic displays.

E. System configuration and definition:

1. 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.
2. The system shall be provided complete with all equipment and documentation necessary to allow an operator to independently perform the following functions:
  - a. Add/delete/modify DDC panel
  - b. Add/delete/modify operator workstations
  - c. Add/delete/modify application-specific controllers
  - d. Add/delete/modify points of any type and all associated point parameters and tuning constants
  - e. Add/delete/modify alarm reporting definition for points

- f. Add/delete/modify control loops
  - g. Add/delete/modify energy management applications
  - h. Add/delete/modify time and calendar-based programming
  - i. Add/delete/modify totalization for points
  - j. Add/delete/modify historical data trending for points
  - k. Add/delete/modify custom control processes
  - l. Add/delete/modify any and all graphic displays, symbols and cross-reference to point data
  - m. Add/delete/modify dial-up telecommunication definition
  - n. Add/delete/modify all operator passwords
  - o. Add/delete/modify alarm messages
- F. Additional workstation software:
- 1. Automatic communications shall include the following features as a minimum:
    - a. Manual communication from the workstation to remote networks shall be accomplishable using only a mouse to select and request the desired remote connection.
    - b. Alarms shall automatically communicate with the workstation for display at the terminal and for hard-copy printout at the associated event printer.
    - c. Alarms shall, at the operator's option, communicate with a stand-alone printer to provide for real-time alarm printouts even when the workstation is off-line (such as when it is being used to run operator-selected third party software).
    - d. Trend data shall be scheduled for automatic updating to the workstation at operator-selected times. The operator shall also have the option of manually collecting trend data at any time.

## PART 3 - EXECUTION

### 3.1 HARDWARE AND SOFTWARE INSTALLATION

- A. Install the control system in accordance with manufacturer's instructions, complete and operating as shown and specified.
- B. See drawings for the level of controller required for each type system control.

### 3.2 TESTS

- A. Installer shall test, calibrate, and adjust the system and perform final field test. COR shall witness tests.
- B. Final field test:
  - 1. Sensors: Cross-check each sensor by comparing the reading at the sensor to a standard traceable to the National Institute of Standards and Technology (NIST).
  - 2. Control points: Cross-check each control point by comparing the control command to the field-controlled device.
  - 3. Verify that systems are operable from local controls in the specified failure mode upon panel failure or loss of power.
  - 4. Submit test results as required in "Submittals" in Part 1 above.
- C. Compliance inspection: Schedule compliance inspection only after installer has conducted all the test operations required above and successfully completed them, as substantiated by the required submittals. Conduct the compliance inspection with the Government's designated representative and the COR. Conduct each activity described on the "Compliance Inspection Checklist" attached

at the end of this Section. When each activity is satisfactorily completed, the Government's representative (user) and the Engineer (A/E) will initial and date the line provided on the checklist.

1. If any item on the checklist cannot be complied with, submit a written explanation.
2. Complete the checklist and submit as required in "Submittals" in Part 1.

### 3.3 OPERATING INSTRUCTIONS

- A. Coordinate instruction period with requirements of Section 23 0500.
- B. Provide competent instructors to give full instruction to designated personnel in the adjustment, operation, and maintenance of the system installed, rather than a general training course. Instructors shall be thoroughly familiar with all aspects of the subject matter they are to teach. Training shall be held during normal work hours of 8:00 a.m. to 4:30 p.m. weekdays as follows:
- C. Provide training for Government's operating personnel. Training shall include:
  1. Explanation of drawings, operations, and maintenance manuals.
  2. Walk-through of the job to locate control components.
  3. Operator workstation and peripherals.
  4. DDC panel and ASC operation/function.
  5. Operator control functions including graphic generation and field panel programming.
  6. Operation of portable operator's terminal.
  7. Explanation of adjustment, calibration, and replacement procedures.
- D. Provide 4 hours of additional training quarterly for a period of one year from final completion of the project.
- E. The Government may require personnel to have more comprehensive understanding of the hardware and software. Additional training shall be available from the installer, after completion of the work of the project. Provide description of available local and factory customer training.

END OF SECTION 23 0923

Compliance Inspection Checklist follows Section.

COMPLIANCE INSPECTION CHECKLIST

Project: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

1. Manually generate an alarm at a remote DDC panel to demonstrate the capability of the workstation and alarm printer to receive alarms within 5 seconds.

User \_\_\_\_\_ Date \_\_\_\_\_ A/E \_\_\_\_\_ Date \_\_\_\_\_

2. Disconnect an operator workstation in the central control room and manually generate an alarm at a remote DDC panel to demonstrate the capability of the system printer to receive alarms when the workstation is disconnected from the system.

User \_\_\_\_\_ Date \_\_\_\_\_ A/E \_\_\_\_\_ Date \_\_\_\_\_

3. Disconnect one DDC panel from the network to demonstrate that a single device failure shall not disrupt or halt peer-to-peer communication. Panel to be disconnected shall be selected by the COR.

User \_\_\_\_\_ Date \_\_\_\_\_ A/E \_\_\_\_\_ Date \_\_\_\_\_

4. At a DDC panel of the COR's choice, display on the portable operator's terminal:

- a. At least one temperature setpoint and at least one status condition, (for example, on or off for a system or piece of equipment attached to that panel), as well as for points at another DDC panel on the network.
- b. The diagnostic results as specified for a system or piece of equipment attached to that panel as well as for a system or piece of equipment attached to another DDC panel.
- c. The ability to add a new point to the DDC panel with the POT and have it automatically uploaded to the workstation to modify that panel's stored database.

User \_\_\_\_\_ Date \_\_\_\_\_ A/E \_\_\_\_\_ Date \_\_\_\_\_

5. At an ASC of the COR's choice, disconnect the LAN connection to demonstrate its lack of reliance on a DDC panel to maintain full control functionality.

User \_\_\_\_\_ Date \_\_\_\_\_ A/E \_\_\_\_\_ Date \_\_\_\_\_

END OF CHECKLIST

## SECTION 23 2113 - HYDRONIC PIPING

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Heating water supply and return.

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

- A. Control valves: Section 23 0908.
- B. Wells: Sections 23 0519 and 23 0913.

#### 1.3 RELATED SECTIONS

- A. Piping materials, installation, and testing: Section 23 0500.
- B. Pipe cleaning and water treatment: Section 23 2500.

#### 1.4 REFERENCES

- A. American Society of Testing and Materials
  1. ASTM A 53: Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded
  2. ASTM A 536: Standard Specification for Ductile Iron Casting
  3. ASTM F1476 – Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications
- B. American Society of Mechanical Engineers
  1. ASME B 16.1: Cast Iron Pipe Flanges and Flanged Fittings
  2. ASME B 16.4: Gray-Iron Threaded Fittings
  3. ASME B 15.5: Pipe Flanges and Flanged Fittings, NPS 1/2 to NPS 24
  4. ASME B 16.9: Factory-Made Wrought Steel Butt Welding Fittings

#### 1.5 SUBMITTALS

- A. Product data: Each specified material and product.

#### 1.6 QUALITY ASSURANCE

- A. The pipe manufacturer shall certify piping to meet referenced standards and shall bear a label, directly on the pipe, indicating compliance.
- B. Date stamp all castings used for coupling housings for quality assurance and traceability.

### PART 2 - PRODUCTS

#### 2.1 PIPE

- A. Black steel, threaded or plain end: ASTM A 53, Grade B, Type E (electric resistance welded), Schedule 40.

## 2.2 FITTINGS

- A. For steel piping: Malleable iron, Class 150, ASME B16.3 (threaded).
  - 1. NPS 2 (DN 50) and smaller, threaded.
- B. Welding fittings: Steel, 150 psi (1030 kPa), ASME B16.9, products of Bonney Forge, Hackney Ladish, Inc., Penn Machine, The Phoenix Forge Group, Taylor Forge, or Weldbend Corporation.
- C. Companion flanges: ANSI B16.5, Class 150, welding neck or slip-on type.
- D. Dielectric pipe nipples shall comply with Section 23 0508.
- E. Threaded joints for heating water systems: Compound recommended by manufacturer for use at the temperature and pressure of the system, or “Teflon” pipe thread tape, specified in Section 23 0500, Common Work Results for HVAC.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install piping as indicated on the drawings and in accordance with provisions of Section 23 0500 and the piping installation schedule at the end of the Section.
- B. Install automatic control valves and insertion wells furnished under Automatic Temperature Controls sections, as indicated on the drawings, and in accordance with manufacturer’s instructions.
- C. Provide dielectric nipples between steel and copper pipe.

### 3.2 CLEANING AND TREATMENT

- A. Clean piping and provide water treatment as specified in Section 23 2500, HVAC Water Treatment.

### 3.3 SCHEDULE

HEATING AND COOLING PIPE INSTALLATION SCHEDULE	
Contractor has option where more than one x appears on a line	
	A
Heating water	X

- A. Schedule 40 black steel, threaded; NPS 2 (DN 50) and smaller with threaded fittings, except water over 125 psi (860 kPa).

END OF SECTION 23 2113

## SECTION 23 2500 - HVAC WATER TREATMENT

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Clean piping systems: Heating water.

#### 1.2 RELATED SECTIONS

- A. Heating piping: Section 23 2113.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. For cleaning heating-piping systems: Detergent, dispersant, and other required chemicals, in accordance with approved product data.

### PART 3 - EXECUTION

#### 3.1 CLEANING PIPING SYSTEMS

- A. Flushing portions of the system:
  1. After a piping loop has been completed and prior to the installation of strainer baskets, flush that portion of the system. Connections shall be same size as piping being flushed, or one size smaller.
  2. When a major section of the building has been completed, repeat the same procedure, except that pipe connections shall be limited to NPS 1.5 (DN 40).
  3. Flushing shall remove sediment, scale, rust and other foreign substances.
  4. After flushing, install strainers and pressure-test system and repair leaks.

#### 3.2 OPERATING INSTRUCTIONS

- A. As specified in Section 23 0500, provide operating instructions.

END OF SECTION 23 0500



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## SECTION 23 3113 - METAL DUCTS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. HVAC supply, return, and exhaust metal ductwork and plenums in pressure classes from minus 2 to plus 10 inches wg (minus 500 to plus 2490 Pa).
- B. Single-wall round duct.
- C. Insulated flexible ducts in HVAC systems.
- D. Sealants.
- E. Acoustical lining.
- F. Duct leakage testing.

#### 1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Firestopping: Division 07.
- B. Insulation: Section 23 0713.
- C. Balancing: Section 23 0593.

#### 1.3 REFERENCES

- A. SMACNA HVAC DCS: SMACNA HVAC Duct Construction Standards, Metal and Flexible.
- B. SMACNA RIDCS: SMACNA Round Industrial Duct Construction Standards.
- C. SMACNA: HVAC Air Duct Leakage Test Manual.
- D. ASHRAE Handbook: Fundamentals.
- E. ASTM C 423: Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
- F. ASTM C 1071: Thermal and Acoustical Insulation (Glass Fiber, Duct Lining Material).
- G. ASTM D 1330: Rubber Sheet Gaskets.
- H. ASTM G 21: Determining Resistance of Synthetic Polymeric Materials to Fungi.
- I. ASTM G 22: Determining Resistance of Synthetic Polymeric Materials to Bacteria.
- J. ACGIH-01: American Conference of Governmental Industrial Hygienists, Industrial Ventilation: A Manual of Recommended Practice.
- K. UL 181: Factory-Made Air Ducts and Air Connectors.

#### 1.4 DEFINITIONS

- A. Seam: Joining of two longitudinal (parallel to the direction of airflow) edges of duct surface material. All other duct surface connections are joints.
- B. Joints: Transverse joints (perpendicular to the direction of airflow); branch and subbranch intersections; duct collar tap-ins; louver and air terminal connections to ducts; access door and access panel frames and jambs; duct, plenum, and casing abutments to building structures.

#### 1.5 SYSTEM PERFORMANCE REQUIREMENTS

- A. The duct system design, as indicated, has been used to select and size air moving and distribution equipment and other components of the air system. Do not change the layout or configuration of the duct system except as specifically approved in writing. Accompany requests for modifications with calculations showing that the proposed design will provide the original design results without increasing the system total pressure.

#### 1.6 SUBMITTALS

- A. Shop drawings:
  - 1. Schedule of duct systems with applicable pressure classes and leakage classes.
  - 2. Fabrication, assembly, and installation for each duct system: Indicate duct dimensions, sheet metal thickness, reinforcement spacing, and seam and joint construction; and components and attachments to other work.
  - 3. Calculations when required as specified in the article “System Performance Requirements” above.
  - 4. Include layout drawings for the entire ductwork system, drawn at the same scale as the contract drawings, except no smaller than 0.125 inch equals one foot.
  - 5. Schedule of sealing methods for each type of seam and joint.
- B. Product data:
  - 1. Acoustical duct lining, adhesive, and sealants.
  - 2. Hangers and supports.
  - 3. Manufactured ducts and fittings.
  - 4. Joint and sealing materials.
  - 5. Manufacturer’s installation instructions.
- C. Test reports: Air Duct Leakage Test Summary: Submit data on forms as indicated in the SMACNA HVAC Duct Leakage Test Manual. (See sample form at end of section.)

#### 1.7 QUALITY ASSURANCE

- A. Specified and scheduled duct construction exceeds SMACNA requirements. Comply with specifications and schedules, and for materials or methods not specified or scheduled, comply with SMACNA HVAC DCS and RIDCS.
- B. Comply with NFPA 90A and 90B.

### PART 2 - PRODUCTS

## 2.1 AVAILABLE MANUFACTURERS

- A. Basis-of-design products: Subject to compliance with requirements, provide specified or noted products, or comparable product by one of the following:
1. Manufactured ducts and fittings:
    - a. Eastern Sheet Metal
    - b. Hamlin Sheet Metal
    - c. LaPine Metal Products
    - d. Lindab, Inc.
    - e. McGill Airflow Corp.
    - f. MKT Metal Manufacturing
    - g. Semco Mfg. Inc.
    - h. SPIRAmir
    - i. Or approved equal.
  2. Manufactured joint connectors:
    - a. Ductmate Industries
    - b. C.L. Ward & Family Inc.
    - c. Or approved equal.
- B. Special use ducts and fittings: Scheduled manufacturers and named products are intended to set a standard for materials, quality of construction, and performance.

## 2.2 MATERIALS

- A. Galvanized steel sheets: Lock-forming quality, ASTM A 653/A 653M, coating designation G90 (Z275).
- B. Carbon steel sheets: Cold-rolled, ASTM A 366/A 366M, commercial quality, with oiled matte finish.
- C. Reinforcement shapes and plates: Galvanized steel where installed on galvanized sheet steel ducts; carbon steel on carbon steel ducts and compatible materials on aluminum and stainless steel ducts.
- D. Tie rods: Galvanized steel, minimum diameter 0.25 inch (6 mm) for ducts up to 36 inches (900 mm); 0.375 inch over 36 inches (900 mm).
- E. Vapor barrier: Polyethylene sheet, 6 mils (0.15 mm) thick, conforming to Federal Specification UU-P-147 for permeability.

## 2.3 JOINT AND SEALING MATERIALS

- A. Duct joint and seam sealants: UL classified, fire-resistive, conforming to NFPA 90A and 90B, high pressure type (up to 10 inches (2490 Pa) SMACNA pressure class) equal to the following products:
1. Indoor application: Hardcast "Iron Grip" (IG-601) brush-on water-based vinyl acrylic sealing mastic.
  2. Flange gaskets: Butyl rubber or EPDM polymer with polyisobutylene plasticizer.

#### 2.4 MINERAL FIBER ACOUSTICAL LINING FOR RECTANGULAR DUCTWORK

- A. Mineral fiber, ASTM C 1071, Type 1, flexible; meeting requirements of NFPA 90A and 90B, bonded with thermosetting resin.
- B. Density: Nominal 2 lbs per cu ft (32 kg per cu m).
- C. Facing: Black composite sprayed-on surface, recommended by manufacturer to prevent particles from penetrating the fiberglass, and to be cleaned by vacuum or dusting.
- D. Resistance to microbial growth: Tested and shown to support no growth of:
  - 1. Fungi in accordance with ASTM G 21.
  - 2. Bacteria in accordance with ASTM G 22.
- E. Thickness:
  - 1. Typical: One inch (25 mm) thick, ASTM C 423 (Type A mounting) noise reduction coefficient (NRC) at least 0.60.
- F. Adhesive for acoustical lining: Equal to Foster 85-60, non-flammable elastomer adhesive designed for attaching low density duct liner and fibrous glass insulation to sheet metal.

#### 2.5 ROUND DUCTS AND FITTINGS

- A. Single-wall, spiral round duct and fittings: Equal to McGill Airflow “Uni-Seal” spiral duct with “Uniform” fabricated fittings.
  - 1. Material: Galvanized steel.
  - 2. Fittings for branch connections shall be conical type. Centerline radius of elbows shall be 1.5 times the diameter. Duct access door shall be equal to type AR-W.
  - 3. Metal thickness:

<u>Round Ducts</u>	<u>Steel Gage</u>
Up to 14 inches diameter	26
15 through 26 inch diameter	24
Fittings up to 36 inch diameter	20

- B. Single-wall, longitudinal-seam round duct and fittings: Fabricate of galvanized steel according to SMACNA HVAC DCS.
  - 1. Seam: Flat lock; snap-lock seam not permitted.

#### 2.6 MANUFACTURED SPECIAL FLEXIBLE DUCTS AND FITTINGS

- A. Insulated flexible duct for HVAC systems: Factory pre-insulated, complying with NFPA 90A, listed as Class 1 air duct in conformance with UL 181, and UL rated for a positive pressure of 10 inches of water (2490 Pa) (through 18-inch (457-mm) size).
  - 1. Core: Non-metallic airtight polyester with galvanized wire helix.
  - 2. Insulation: Fiberglass blanket, 1.5 inches (38 mm) thick, 0.75 lb density, and k factor 0.28 at 75 degrees F (23.9 degrees C).

- a. Vapor barrier: Aluminized and reinforced.
  - 3. Connections: Accessories required by manufacturer's published instructions.
- 2.7 HANGERS AND SUPPORTS
- A. Hangers: Galvanized sheet steel, or round, galvanized steel, threaded rod.
    - 1. Hangers installed in corrosive atmospheres: Electro-galvanized, all-thread rod; or hot-dipped-galvanized rods with threads painted with zinc-rich paint after installation.
    - 2. Straps and rod sizes: Conform to SMACNA HVAC DCS for sheet steel width and gage and steel rod diameters.
  - B. Duct attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- 2.8 FABRICATION
- A. Dimensions indicated on drawings are outer dimensions of ducts. Dimensions indicated for double-wall ducts are outer dimensions of outer wall.
  - B. Verify field measurements and resolve conflicts, before beginning to fabricate ductwork, as specified in Part 3 below.
- 2.9 DUCT CONSTRUCTION
- A. Construct ductwork using the Duct Construction Schedule on the drawings. Schedule includes duct system pressure class requirements, minimum sheet metal gages, leakage allowances, and maximum reinforcement spacing. These requirements exceed the requirements of SMACNA HVAC DCS.
  - B. Construct ductwork of galvanized steel, except where another material is noted on drawings or specified.
  - C. Construct gravity duct systems (nonfan-powered), such as pressure relief and transfer, in accordance with SMACNA HVAC DCS minimum one inch pressure class unless otherwise scheduled.
  - D. Crossbreak or bead ducts of dimensions of 12 inches (305 mm) and over in pressure classes under 2 inches (500 Pa).
  - E. Plenums, casings, and access doors: Construct in accordance with SMACNA HVAC DCS.
    - 1. Casings and plenums for negative pressures greater than 3 inches wg (747 Pa): Construct in accordance with SMACNA RIDCS.
    - 2. Where casings and plenums are on the suction side of fans, and negative pressure which exceeds their construction class may occur, provide safety relief panels or dampers as indicated on drawings.
  - F. Joint connections shall be constructed in accordance with SMACNA HVAC DCS, or with a manufactured duct connection system equal to Ductmate Industries "Ductmate," selected to assure compliance with leakage factors indicated on the drawings. Snap-lock or flat-lock seams are not acceptable.

- G. Engineered duct systems using metal gages or reinforcing less than required in the schedules on the drawings are not acceptable.
- H. Where not otherwise specified, scheduled, or detailed, construct ductwork in accordance with SMACNA HVAC DCS.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Before fabricating ductwork, make field measurements and coordinate layout of ductwork shown on the drawings with building components and work of other trades. Resolve conflicts and obtain written approval for deviations before fabrication.
- B. Provide duct systems complete with built-in accessories as specified herein, in other sections of the specifications, as indicated on the drawings, and, where not otherwise indicated, in accordance with SMACNA HVAC DCS.
- C. Thoroughly clean duct and duct fittings before they are installed, and keep them clean until the acceptance of the completed work. Use a duct cap cover on all unfinished ends to prevent moisture, dirt particles, dust, and debris from entering the installed ductwork during construction.

### 3.2 INSTALLING METAL DUCTWORK

- A. Provide ductwork shown on drawings and specified herein.
- B. Install metal ductwork neat in appearance. Interior surfaces shall be smooth and free of obstructions. Duct lines shall be true and smooth. Where ducts pass through openings in partitions, ceilings and floors, fit them with trim angles to close joint between duct and construction.
- C. Acoustical lining: Where indicated on drawings, or required by specifications, install acoustic lining on interior surfaces of ducts. Sizes shown on the drawings for rectangular ducts are sheet metal dimensions and include allowance for liner thickness. Install in accordance with SMACNA HVAC DCS, except as the following requirements are more stringent.
  - 1. Adhesive: Adhere liner to interior surfaces of duct with 100 percent coverage. Before assembling lined sections, coat exposed abutting edges of liner with adhesive.
  - 2. Mechanical fasteners: On 16-inch (406-mm) maximum centers on top and sides; on 4-inch (100-mm) centers within 2 inches (50 mm) of leading edge of transverse joints on top, bottom, and sides.
- D. Support ductwork on metal straps or rods in accordance with SMACNA HVAC DCS and as specified. Comply with manufacturers' load ratings and application data for each type of support and fastener.
  - 1. Connections to substrate:
    - a. Concrete: Inserts or fasteners specified in Section, Hangers, Supports, and Anchors. Install inserts before placing concrete.
    - b. Structural steel: Beam clamps.
    - c. Do not support ductwork from gypsum roof deck supports or metal deck.

2. Ducts 54 inches (1372 mm) wide and under: Strap hangers shall extend down sides of ducts and attach to underside with at least two sheet metal screws per strap. Straps shall be made of the same metal as the ducts they are attached to.
  3. Round ducts: Support on rods or galvanized straps, and bands, as shown in SMACNA HVAC DCS and in accordance with manufacturer's recommendations.
  4. Support horizontal ducts within 2 feet (610 mm) of each elbow and within 4 feet (1220 mm) of each intersection, in addition to spacing required by SMACNA.
- E. Make bends and turns in ductwork using offsets and curved or square elbows as indicated on the drawings. Provide full radius elbows (centerline radius equals 1.5 times duct width). Provide turning vanes in square elbows, as specified in Section 23 3300, Duct Accessories. Make 90-degree branch duct connections using 45-degree entry fittings where indicated.
- F. Provide for and install in ductwork all automatic control systems dampers, thermometers, coils, duct accessories and similar equipment furnished under this or other sections of the specifications. Where ATC dampers with frames and other accessories are mounted in ductwork, the ducts shall connect to the accessory frame in manner to provide 100 percent free area for air passage. Seal duct connections to frames with gaskets or duct sealant. Secure connections with pop rivets or sheet metal screws spaced no more than 3 inches (75 mm) on centers around both sides of entire frame. Provide angle iron or channel frames as required for mounting ATC dampers and manual dampers over weatherproof louvers for air intakes and exhaust.
- G. Generally, it is intended that all horizontal ductwork be a minimum of 10 inches (255 mm) above suspended ceiling (where applicable) to allow for removal of ceiling panels and ceiling-mounted light fixtures and devices.
- H. Assemble round ducts and fittings using duct sealant and sheet metal screws as recommended by the manufacturer.
- I. Where noted on the drawings provide sheet metal drain troughs under piping.

### 3.3 INSTALLING ROUND DUCT

- A. Single-wall: Single-wall, spiral duct and fittings.
1. Exception: Single-wall, longitudinal-seam duct is permitted where concealed, in systems of 2 inches wg pressure class or less, for connections to individual air outlets.

### 3.4 SEALING DUCTWORK

- A. Ducts shall be sealed so that they meet leakage factors scheduled on the drawings.
- B. Prior to sealing, ductwork shall be clean and dry, free of oil or grease.
- C. Apply sealant in accordance with the manufacturer's recommendations.
- D. Product application:
1. Galvanized steel: Brush-on or pressure sensitive sealant, as applicable.
- E. Allow time for sealant to dry or cure, in accordance with manufacturer's recommendations, before leak testing.



### 3.5 INSTALLING INSULATED FLEXIBLE DUCT (HVAC SYSTEMS)

- A. Provide insulated flexible duct where shown on drawings. Install fully extended and route as directly as possible to supply outlets. Lengths shall not exceed 10 feet.
- B. Lay out bends and turns with the longest practicable radius, as a minimum exceeding SMACNA standards for radius of rigid duct radius elbows. Ends shall extend straight for at least 6 inches before beginning of bend.
- C. Connections: Coat at least 3 inches inside the end of the flexible duct core with duct sealant, install over the rigid duct, and secure with a duct clamp. After replacing the insulation and vapor barrier, secure with another duct clamp.
- D. Support flexible duct in accordance with the manufacturer's recommendations or SMACNA DCS, whichever is more stringent.

### 3.6 IDENTIFICATION

- A. Mark ductwork in accordance with requirements for identification specified in Section 23 0500, Common Work Results for HVAC.

### 3.7 AIR DUCT LEAKAGE TESTS

- A. Leakage test procedures shall be in accordance with SMACNA Leakage Test Manual.
- B. After installation and prior to insulating, test the ductwork for air leakage. Ducts to be tested, test pressures, and leakage factors (maximum volume of leakage per 100 sq ft (9.3 sq m) of duct surface area) shall be as scheduled on the drawings.
- C. Conduct tests before any equipment is connected that would be subject to damage from the test pressure. Provide temporary blank-offs or caps.
- D. Notify parties whose presence is necessary for the test; and in all cases, the COR and testing and balancing subcontractor at least two normal work days prior to the actual test.
- E. While system is under test pressure, survey joints for audible leaks. Mark leakage points, shut down blower, and make repairs. Retest after duct sealant has dried or cured.
- F. If test duct sections exceed the allotted leakage levels, locate sources of leakage, make repairs and repeat test procedures until acceptable leakage levels are demonstrated.
- G. During the installation, continuously examine ductwork to ascertain that it is sealed properly.

### 3.8 CLEANING EXISTING SYSTEMS

- A. Use service openings, as required, for physical and mechanical entry and for inspection.
  - 1. Use existing service openings where possible.
  - 2. Create new openings to comply with duct standards as required to accomplish proper cleaning.
  - 3. Disconnect flexible ducts as needed for cleaning and inspection.
  - 4. Remove and reinstall ceiling sections to gain access during the cleaning process.

- B. Mark position of dampers and air-directional mechanical devices before cleaning, and restore to their marked position on completion.
- C. Particulate collection and odor control:
  - 1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron size (or larger) particles.
  - 2. When venting vacuuming system to the outside, use filtration to contain debris removed from HVAC system, and locate exhaust down wind and away from air intakes, doors, and other points of entry into building.
- D. Clean the following metal duct systems by removing surface contaminants and deposits:
  - 1. Air outlets and inlets (registers, grilles, and diffusers).
  - 2. Return-air ducts, dampers, and actuators.
  - 3. Supply-air ducts, dampers, actuators, and turning vanes.
  - 4. Dedicated exhaust and ventilation ductwork and components.
- E. Mechanical cleaning methodology:
  - 1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
  - 2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
  - 3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
  - 4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
  - 5. Provide operative drainage system for washdown procedures.
  - 6. Biocidal agents and coatings: Apply biocidal agents if fungus is present. Apply biocidal agents according to manufacturer's written instructions after removal of surface deposits and debris.
- F. Cleanliness verification:
  - 1. Verify cleanliness after mechanical cleaning and before application of treatment, including biocidal agents and protective coatings.
  - 2. Visually inspect metal ducts for contaminants.
  - 3. Where contaminants are discovered, re-clean and reinspect ducts.

### 3.9 CLEANING DUCT SURFACES

- A. Where ducts will be exposed and therefore are required to be painted, remove labels used for construction and clean surfaces ready for painting.

END OF SECTION 23 3113  
Leakage test form follows Section

PROJECT NAME \_\_\_\_\_ PROJECT NO. \_\_\_\_\_

PAGE \_\_\_\_\_ OF \_\_\_\_\_

**AIR DUCT LEAKAGE TEST SUMMARY**

AIR SYSTEM \_\_\_\_\_

FAN CFM (Q) \_\_\_\_\_

LEAKAGE CLASS ( $G_L$ ) \_\_\_\_\_

SPECIFIED TEST PRESSURE ( $P_t$ ) \_\_\_\_\_

DUCT CONSTRUCTION PRESSURE CLASS ( $P_c$ ) \_\_\_\_\_

DESIGN DATA				FIELD TEST DATA RECORD							
SUBJECT DUCT	SURFACE AREA IN FT <sup>2</sup>	ALLOWABLE LEAKAGE		DIAMETER		PRESSURE "W.G.		DATE	PERFORMED BY	WITNESSED BY	ACTUAL CFM
			CFM (TEST SECTION)								
TOTAL SYSTEM				****	***	**	*****	****	****	****	
TEST SECTION(S)											

## SECTION 23 3300 - DUCT ACCESSORIES

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Products and devices installed in ducts.
- B. Volume extractors.
- C. Instrument test holes.
- D. Air turning vanes.
- E. Spin-in or dovetail fittings.
- F. Duct access doors.
- G. Dampers.
- H. Duct clamps.

#### 1.2 RELATED SECTIONS

- A. Access doors: Section 23 0503.
- B. Diffusers, registers, and grilles: Section 23 3713.
- C. Damper actuators: Automatic temperature control sections.

#### 1.3 REFERENCES

- A. AMCA 210: Laboratory Methods of Testing Fans for Rating.
- B. ASTM E 477: Test for Measurement of Acoustical and Airflow Performance of Duct Liner Materials and Prefabricated Silencers.
- C. ASTM E 2016: Standard Specification for Industrial Woven Wire Cloth.
- D. NFPA 90A: Installation of Air Conditioning and Ventilating System.
- E. NFPA 90B: Installation of Warm Air Heating and Air-Conditioning Systems.
- F. SMACNA-05: Fire, Smoke and Radiation Damper Installation Guide for HVAC Systems.
- G. SMACNA HVAC DCS: HVAC Duct Construction Standards, Metal and Flexible.

#### 1.4 SUBMITTALS

- A. Product data: Each type of duct accessory included in the project.

- B. Shop drawings: Detail equipment assemblies and indicate dimensions, loadings, required clearances, method of field assembly, components, locations, and size of each field connection. Detail these accessories:

- 1. Special fittings and manual and automatic volume damper installations.

- C. Certifications: Certified test data for dynamic insertion loss; sound power levels; airflow performance data, and static-pressure loss.

## 1.5 QUALITY ASSURANCE

- A. Work of this section shall comply with NFPA 90A and 90B, and SMACNA HVAC DCS.

## PART 2 - PRODUCTS

### 2.1 AVAILABLE MANUFACTURERS

- A. Manufacturers' names and specific products are described in the articles below to set a standard for materials, quality of construction, options and details, and performance. Provide named products, or equal products by other manufacturers.

### 2.2 MATERIALS

- A. Sheet metal: As specified in Section 23 3113.

### 2.3 MANUFACTURED UNITS

- A. Volume extractors: Equal to Hart & Cooley "Vectrol" Type AVL R, with the equal to Young Regulator Co. No. 429 FD end bearing and No. 443-B 3/8-inch operator; or Type VLK, with worm-driven mechanism accessible through face of diffuser or grille with an 18-inch-long removable key operator.
- B. Instrument test holes for ductwork balancing stations: Equal to Ventfabrics "Ventlock" No. 699 or 699-2 as required for insulation thickness, with gasket for base, and threaded cap.
- C. Air turning vanes: Double vane type, constructed in accordance with SMACNA HVAC DCS, from the same material as the duct.
- D. Spin-in or dovetail fittings in accordance with SMACNA HVAC DCS are acceptable for a round take-off connection from a rectangular duct, provided they meet the duct pressure classification.

### 2.4 DUCT ACCESS DOORS

- A. SMACNA standard construction, Air Balance, Inc., Model FSA-100-H or equal by Ruskin, Inc., Airstream Products Company, Inc., or Commercial Acoustics. Access doors to fire protection devices shall comply with NFPA 90A.
- B. Construction: Door and frame fabricated of 24 gage galvanized steel, minimum size 16 inches (406 mm) by 16 inches (406 mm), or 16 inches (406 mm) by maximum duct size.
- C. Door: Hinged with continuous piano hinge; number of cam latches to suit door size. Insulated doors shall be double pan construction, one inch (25 mm) thick with one inch (25 mm) thick minimum 3.5 pound (56 kg per cubic meter) density fiberglass insulation cut full to require forcing into the pan.

- D. Gaskets: Continuous around perimeter, sealing frame to duct and door to frame, neoprene or foam rubber.
- E. As an option, provide round access doors equal to Ventfabrics "Ventlok Twist-In" doors, complete with safety holding cable, 12 inches (305 mm) diameter.

## 2.5 DAMPERS

- A. Manual volume dampers:
  - 1. 13 inches (330 mm) and larger in height: Balanced multi-louver, opposed-blade type with maximum blade width of 6 inches (155 mm), equal to Ruskin Model MD 35 with corrosion resistant, molded synthetic sleeve type bearing and 0.375-inch (9.5-mm) square control shaft; and with Young Regulator Co. Model No. 443B-3/8 damper regulators designed with 2-inch high base for mounting on externally insulated duct.
  - 2. 12 inches (305 mm) or less in height: Fabricated from 16 gage metal with hemmed edges, 0.375-inch (9.5-mm) square rod, Young Regulator Co. Model No. 443B-3/8 regulator designed with 2-inch high base for mounting on externally insulated duct and Model No. 429 FD end bearing.

## 2.6 ACCESSORIES

- A. Duct clamps for flexible duct connections: Positive locking drawbands able to conform to any shape. Fabricate from a single piece of galvanized steel, with zinc-plated steel screw and buckle. Equal to "59 Series" manufactured by Ideal Division, Parker Hannifin Corporation.
- B. Nonmetallic duct clamps for flexible duct connections: Heavy-duty adjustable type equal to products of Tyton Corporation, for 12-inch (305-mm) diameter and smaller flexible ductwork, complying with UL 181.
- C. Instrument test holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments, and length to suit duct insulation thickness.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Duct accessories shall be mounted or installed properly in accordance with the manufacturer's instructions and as indicated on the drawings.

### 3.2 INSTALLING MANUFACTURED UNITS

- A. Provide necessary devices to balance the air flow to produce air quantities at outlets as indicated on the drawings.
- B. Provide balancing point stations where required for air balancing. Coordinate work with requirements of Section 23 0593, Testing, Adjusting, and Balancing; final locations shall be as directed by the balancing and testing subcontractor. Stations shall consist of test holes spaced 6 inches (150 mm) on centers across bottom or side of duct. Install test holes before ducts are insulated.
- C. Provide turning vanes in 90-degree square elbows.

- D. Provide spin-in or dovetail fittings as indicated on the drawings. Where connecting to lined ductwork, provide fittings with sleeve designed for installing with liner.
- E. Installing duct access doors:
  - 1. Install duct access doors in ductwork for access to fire dampers, smoke dampers, ATC dampers, controls, vortex dampers, duct coils, control devices, and any other devices, equipment, or components requiring maintenance, service, or adjustment and located inside ducts or adjacent equipment.
  - 2. Provide OSHA-approved labels on doors enclosing fire protection devices. Labels shall have lettering at least 1/2 inch (13 mm) high describing the protection device enclosed.
- F. Installing air control devices:
  - 1. Install manual volume dampers, volume extractors, and other devices at locations indicated on drawings and where required to properly balance the systems and to deliver the air quantities indicated. Each damper and device shall have substantial operators of proper size with locking facilities. Volume dampers shall be equipped with locking type regulators.
  - 2. Install automatic control dampers.

END OF SECTION 23 3300

## SECTION 23 3600 - AIR TERMINAL UNITS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Single-duct variable-air-volume (VAV) terminal units.

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

- A. Room thermostat, installed as specified in Section 23 0913, Instrumentation and Control Devices for HVAC.

#### 1.3 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

- A. The terminal unit manufacturer shall install controllers and damper actuators furnished as specified in Section 23 0901, Automatic Temperature Control System.
- B. Provide the automatic temperature control subcontractor with a description of the terminal units and requirements for coordinating with control system.
- C. Provide wiring, tubing, and hardware components necessary to produce complete operational units, including transformer, fan relay, inlet airflow pickup, and access to controls.

#### 1.4 RELATED SECTIONS

- A. Controls: Sections 23 0901 through 23 0923.
- B. Balancing: Section 23 0593.

#### 1.5 REFERENCES

- A. UL 181: Factory-made Air Ducts and Air Connectors.
- B. NFPA 90A: Installation of Air Conditioning and Ventilating Systems.
- C. NFPA 90B: Warm Air Heating and Air Conditioning Systems.
- D. ARI 880: Air Terminals.

#### 1.6 PERFORMANCE REQUIREMENTS

- A. Coordinate controls with the control manufacturer to affect specified unit performances and unit operation as required by the control sequences.
- B. Coordinate with and assist balancing agency to perform tests specified in section, Testing and Balancing.

#### 1.7 SUBMITTALS

- A. Product data: Each type of terminal unit and each component.
- B. Shop drawings:



1. Show complete dimensions of complete assembled unit with accessories.
  2. Include schedule of units, showing performance data for each unit.
  3. Include unattenuated (raw) sound power levels for each size unit, at specified rating conditions, for both radiated and discharge sound. Submit sound data with no corrections or noise reduction factors applied, at the airflow rates indicated on schedules at end of section.
- C. Certifications: Factory certification that sound data required in “Shop Drawings” above have no corrections or noise reduction factors applied; or, if data do include such factors, guaranteeing that the equipment will meet the scheduled sound level requirements.

## 1.8 QUALITY ASSURANCE

- A. Terminal units shall be certified and listed in the current ARI Directory of Certified Applied Air-Conditioning Products. Listed sound power levels shall show that units meet requirements scheduled at the end of this section.
- B. UL label and local testing (if required): As specified in Section 23 0500, Common Work Results for HVAC.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Scheduled units are the basis for design of the project. The following listed manufacturers also provide units of acceptable quality. If units by any of these manufacturers should be proposed, verify that they meet requirements specified in Division 01 and the article “Product Options” in Section 23 0101, and submit product data and shop drawings as specified in the article “Submittals” above.
- B. Single-duct units:
  1. Trane Company “Varitrane” with heating water coil.
- C. Drawings show duct and pipe connections, and size and arrangement of unit, based on configuration of design basis unit. Do not propose another manufacturer’s unit, which cannot be made to fit in the space shown. Revise duct and pipe connections and other conditions as necessary to make another manufacturer’s unit meet the project requirements, without addition to the Contract Sum.

### 2.2 MATERIALS

- A. Sheet metal: Galvanized steel.
- B. Insulation: Fiberglass, meeting requirements of UL 181 and NFPA 90A and 90B, rated for 4000 fpm air velocity.
  1. Thickness: Manufacturer’s standard thickness, to achieve thermal resistance no less than R value of 4.
  2. Facing: Manufacturer’s standard acrylic matte coating.

### 2.3 AIR TERMINAL UNITS, GENERAL

- A. Terminal units shall be pressure-independent, each a complete factory-assembled unit, including automatic controls and the features specified or scheduled on the drawings.
- B. Provide units of the types, sizes, and capacities scheduled on the drawings.
- C. Sound power levels: ARI 880, certified and listed in ARI Applied Products Directory, and not exceeding the levels scheduled at the end of this section.
- D. Casing: Not less than 22 gage steel; airtight, leakage no more than two percent at 3.0 inches wg (747 Pa).
  - 1. Lining: Insulation, cut edges exposed to airstream finished and sealed with facing material.
  - 2. Internal access: Removable bottom panel for access to components requiring service, adjustment, or maintenance; with airtight seal.
- E. Duct connections: Round or oval duct collar for primary air connection and a single rectangular flanged connection for discharge.
- F. Wiring: Completely factory-wired, UL tested and listed as a complete assembly, with a single-point power connection and single-point control connection. Include control transformers and a power disconnect switch.
- G. Temperature sensor: Direct digital type, provided as specified in Section 23 0923, Direct Digital Building Systems Control.
- H. Air control valve (damper): Constructed of minimum 22-gage steel, bolted or welded to a continuous shaft which rotates in self-lubricating Delrin or bronze oilite bearings, closing against a closed-cell gasket. Units with multiple blades shall be in the opposed-blade configuration. Blade(s) shall not deflect at inlet pressures up to 6 inches wg. Maximum leakage shall not exceed 2 percent of maximum inlet rated airflow at 3 inches wg inlet pressure.
- I. Averaging velocity sensor: Mount in the inlet of the fan terminal. Sensor shall provide a minimum of one air pickup point for each 2.5 inches of inlet diameter (single-point differential sensors are not acceptable). Provide taps for field measuring and balancing.
- J. Air control valve (damper) actuator: Type required by the automatic temperature control system, capable of operating air control valve under system air pressures.
- K. Controller: Equal to Automated Logic “ZN 341V”, shall maintain airflow setpoint within five percent regardless of system pressure change (airflow-limiting devices are not acceptable).
  - 1. Capable of field adjustment of minimum and maximum airflow settings without the use of tools.
  - 2. Constantly monitors space thermostat input, and terminal unit inlet pressure, through the averaging velocity sensor, to maintain space temperature setpoint.
  - 3. Label: Flow curve for field balancing, affixed to casing.
  - 4. Provide factory-set maximum and minimum airflows scheduled on the drawings.
  - 5. Controller shall maintain pressure independence to as low as 0.03 inch wg pressure differential.
- L. Heating water coil: Aluminum fins bonded to copper tube by mechanical expansion, tested at no less than 300 psig (2068 kPa), performance scheduled on the drawings, removable for maintenance.

## 2.4 SINGLE-DUCT VAV TERMINAL UNITS

- A. Terminal units as specified above, with heating water coil.
- B. Controls: Include a fail-in-place primary air-control valve (damper) with actuator, controller, temperature sensor and devices necessary to accomplish the control sequence.
- C. Control sequence:
  - 1. Terminal unit controls shall be placed in the occupied, unoccupied, and morning warm-up cycles by input signals from a source outside this system. Provide compatibility with related sequences of operation shown on the drawings.
  - 2. Morning warm-up cycle:
    - a. Primary air-control valve shall be fully open.
    - b. Heating water control valve shall modulate to maintain the occupied room temperature setpoint.
  - 3. Occupied cycle:
    - a. Primary air-control valve shall open to the minimum scheduled airflow position.
    - b. On a rise in space temperature above the room temperature setpoint, the primary air-control valve shall modulate towards its scheduled maximum airflow setpoint.
    - c. On a fall in space temperature below the room temperature setpoint, the primary air control valve shall modulate towards its scheduled minimum airflow setpoint.
    - d. When the primary air-control valve is at its minimum airflow setpoint, and on a continued fall in space temperature, the heating water control valve shall modulate to maintain space temperature.

## 2.5 SOURCE QUALITY CONTROL

- A. Factory test units to assure that they operate in accordance with the sequence specified.
- B. Factory calibrate and adjust controls. Pre-set minimum and maximum airflow setpoints to the values scheduled on the drawings.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install terminals as recommended by the manufacturer and as detailed on the drawings, suspended from overhead structure. Support terminals independently of ductwork.
- B. Install units so that access doors or panels can be opened or removed conveniently.
- C. Provide clearance in front of control panels in accordance with NFPA 70 (NEC).

### 3.2 OPERATING INSTRUCTIONS

- A. As specified in Section 23 0500, provide operating instructions.
- B. Provide at least 8 hours of additional instruction time for the systems specified in this section consisting of 1 period of 8 consecutive hours.

3.3 SCHEDULES

- A. Terminals shall not exceed the scheduled sound power levels at the scheduled air flow rates when tested in accordance with ARI 880.

Single-Duct Air Terminals													
Nominal Inlet Size	Rated Air Flow CFM	Radiated Sound Power Level, dB Octave Band Center Frequency, Hz						Discharge Sound Power Level, dB Octave Band Center Frequency, Hz					
		125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
4"	150	65	54	49	43	41	39	70	65	59	55	53	52
5"	250	63	53	48	44	38	38	70	66	60	58	53	49
6"	400	66	63	50	44	42	38	73	69	61	59	52	53
8"	700	67	57	52	46	45	44	70	70	64	61	57	55
10"	1100	72	57	53	48	45	43	78	70	65	61	57	54
12"	1600	71	62	58	51	46	43	75	71	67	62	60	59
14"	2100	77	61	55	50	50	48	76	71	68	64	60	59

END OF SECTION 23 3600

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## SECTION 23 3713 - DIFFUSERS, REGISTERS, AND GRILLES

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Ceiling- and wall-mounted diffusers, registers, and grilles.

#### 1.2 RELATED SECTIONS

- A. Balancing: Section 23 0593.

#### 1.3 REFERENCES

- A. NFPA 90A: Standard for the Installation of Air-Conditioning and Ventilating Systems.

#### 1.4 SUBMITTALS

- A. Product data: Each type of diffuser, register and damper, and grille, including frames and accessories, and performance data.
- B. Shop drawings:
  - 1. Schedule, including size, location, function, and finish of each diffuser, register, and grille.
  - 2. For each air control device, provide information required to balance the system. Include the factor for each size and type of device for converting velocity to volume.
    - a. Include this information in Operating and Maintenance Manuals.
- C. Samples: Manufacturer's complete line of color chips for anodized aluminum linear grilles and diffusers.

### PART 2 - PRODUCTS

#### 2.1 AVAILABLE MANUFACTURERS

- A. Grilles, registers and diffusers:
  - 1. Hart and Cooley Inc.
  - 2. Krueger.
  - 3. Metalaire.
  - 4. Nailor Industries, Inc.
  - 5. Price Company.
  - 6. Titus Products.
  - 7. Or approved equal.

#### 2.2 DIFFUSERS, REGISTERS, AND GRILLES

- A. Devices of one of the named manufacturers, with performance data, characteristics, features, and accessories of the model or type specified or indicated on the drawings. Model numbers specified below are Titus except as noted otherwise.

- B. See architectural drawings for type of walls and ceilings where diffusers, grilles, and registers are required. Coordinate margin and frame of each device with the substrate in which it will be installed. Where devices are installed in suspended ceilings, assure that they will fit correctly in the type of suspension supports shown or specified.
- C. Materials and finish:
  - 1. Construction:
    - a. Steel where mounted in ceilings.
    - b. Either aluminum or steel where mounted in walls near ceiling.
    - c. Heavy-duty steel where mounted in walls near floor.
    - d. Welded or mechanically fastened cores in diffusers located in gymnasium.
  - 2. Aluminum devices shall be all aluminum construction, including dampers, where specifications call for aluminum or stainless steel ductwork.
  - 3. Finish: Manufacturer's standard white enamel, suitable for final finish or for field painting, unless indicated otherwise.
- D. Where narrow margin grilles and registers are specified or indicated on the drawings, they shall be provided with mounting frames except where mounted on ductwork.

## 2.3 SUPPLY DIFFUSERS

- A. Throw length is based on performance data of the scheduled or specified manufacturer and model. Select units of other manufacturers whose performance data meet the required conditions. Throw direction of square and rectangular ceiling diffusers shall be four-way unless otherwise indicated on the drawings.
- B. "SD" - Square, perforated face, round neck: Titus PAS steel construction, hinged perforated face plate, four individually adjustable air pattern controllers with fixed deflection, frame Style 23, nominal 24 by 24 inches (600 by 600 mm) to lay into suspended ceiling grid, round neck.
- C. "LSD" – Linear slot diffusers: Titus ML-39 or Krueger 1900 Series with size of slot and number of slots as indicated on drawings. Adjustable blades, for volume and air direction control, shall be furnished behind active supply sections in each slot opening. Blades and internal surfaces exposed to view shall be painted black. Provide surface mounting with positive holding concealed fasteners. Provide alignment tabs in frame where multiple units are joined, and mitered corners at 90 degree turns.

## 2.4 TRANSFER GRILLES

- A. For plaster wall or ceiling construction, provide with plaster frames.
- B. "TG" Perforated, ceiling-mounted:
  - 1. Titus PAR, frame Style 23, square neck for duct connection, perforated panel to lay into 24-inch by 24-inch or 24-inch by 48-inch ceiling grid as indicated.
  - 2. Titus PAR, frame Style 22, square neck for duct connection, perforated panel with flat face frame for surface mounting.

PART 3 - EXECUTION

3.1 INSTALLING GRILLES, REGISTERS AND DIFFUSERS

- A. Securely attach grilles, registers, and diffusers in place. Do not install the grilles and registers until duct interiors have been painted as specified in Section 23 0500, Common Work Results for HVAC.
- B. Install all air control devices complete with the accessories specified, securely attached in position. Make operating devices accessible.
- C. Adjust diffuser straightening grids to provide uniform air distribution above diffuser face.
- D. Adjust supply register deflectors to provide uniform air distribution to the areas served.

END OF SECTION 23 3713



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## SECTION 26 0101 - ELECTRICAL GENERAL PROVISIONS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. General provisions and requirements for electrical work.

#### 1.2 RELATED SECTIONS

- A. Requirements of this section generally supplement requirements of Division 01.

#### 1.3 REFERENCES

- A. NFPA 10: Portable Fire Extinguishers.
- B. NFPA 241: Safeguarding Construction, Alteration, and Demolition Operations.

#### 1.4 SYSTEM DESCRIPTION

- A. The full set of Contract Documents applies to work of Division 26.
- B. Visit the site and study all aspects of the project and working conditions, as required by General and Supplementary Conditions, Bidding and Contracting Requirements, Drawings, and Specifications. Verify field dimensions.
- C. The work covered in technical sections includes the furnishing of all labor, equipment and materials, and the performance of all operations pertinent to the work described.
- D. Except as required otherwise in Division 01, promptly obtain and pay for, all necessary signatures and paperwork, all permits, fees and inspections required for work of this division by authorities having jurisdiction, including any utility connection or extension charge. No payment will be made until a copy of the permit is forwarded to the Government.
- E. Electrical work of this project includes, as a brief general description, the following:
  - 1. Demolish existing electrical devices from areas being renovated.
  - 2. Provide new lighting fixtures and electrical and fire alarm devices.
  - 3. Modify existing panelboards.
- F. See Division 01 for requirements related to Government's occupancy of the premises, limits on use of site, time restrictions on work, limits on utility outages or shutdowns, and phasing (sequencing) and scheduling.

#### 1.5 PRODUCT OPTIONS

- A. Except as modified by provisions of Bidding and Contracting Requirements and Division 01, these options apply to Division 26 specifications.
- B. General: Where Contractor is permitted to use a product other than the specified item and model named as the basis of design, Contractor is responsible for all coordination and additional costs as specified in article "Substitutions" below for substitutions.

- C. Products specified by reference standards or by description only: Any product meeting those standards or description.
- D. Products specified by naming one or more manufacturers, or model name or catalog reference number: Products specified establish a standard of quality, options to be included, and performance, and shall not be construed as limiting competition. Contractor may use products of any manufacturer, which meet the specifications.
- E. Products specified by naming one manufacturer and particular product, with no provision for other options: No options or substitutions allowed.

#### 1.6 SUBSTITUTIONS

- A. Substitutions will be considered only as permitted or required by the Bidding and Contracting Requirements and Division 01. Except as modified by those requirements, the requirements below apply to Division 26 specifications.
- B. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.
- C. Document each request with complete data substantiating compliance of proposed substitution with contract documents.
- D. A request constitutes a representation that the Bidder or Contractor:
  - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
  - 2. Will provide the same warranty for the substitution as for the specified product.
  - 3. Will coordinate installation and make changes to other work which may be required for the work to be complete with no additional cost to the Government.
  - 4. Waives claims for additional costs or time extension which may subsequently become apparent.
  - 5. Will reimburse the Government for review or redesign services associated with re-approval by authorities.
- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitution submittal procedure is specified in Bidding and Contracting Requirements and Division 01.

#### 1.7 MATERIALS AND EQUIPMENT

- A. All materials and equipment shall be new and the best of their respective kinds, suitable for the conditions and duties imposed on them by the project, and of representative manufacturer. The description, characteristics and requirements of the materials to be used shall be in accordance with the specifications.
- B. All equipment, construction and installation must meet requirements of local, state and federal governing codes.

- C. Singular number: In cases where material, a device, or part of the equipment is referred to in the singular number in the specifications, it is intended that such reference shall apply to as many items of material, devices, or parts of the equipment as are required to complete the installation as shown on the drawings or required for proper operation of the system.
- D. Terms have the following meanings:
  - 1. Furnish: Supply item
  - 2. Install: Mount and connect item
  - 3. Provide: Furnish and install
- E. All materials and equipment shall be installed and completed in a first class and workmanlike manner and in accordance with the best modern methods, practice and manufacturers' instructions. Any work which shall not present an orderly and neat or workmanlike appearance shall be removed and replaced with satisfactory work when so directed in writing by the COR.
- F. The specifications and drawings are intended to define the minimum requirements, as to quality of materials, construction, finish and overall workmanship.
- G. General Conditions describe the correlation and intent of the Contract Documents. In case of discrepancies between the specifications and drawings, the specifications should be followed as to the general methods and principles and the drawings followed as to sizes, capacities and specifics for corresponding parts. If sizes are omitted, the COR will determine sizes to be utilized.
- H. In all cases of doubt, uncertainty, or conflict as to the true meaning of the specifications or drawings, it is the responsibility of the Contractor to notify the COR of said uncertainty, doubt, or conflict and obtain a decision as to the intent prior to initiating any work which may be affected by this decision.

#### 1.8 COORDINATION

- A. Should a situation develop during construction to prevent the proper installation of any equipment or item where shown on the drawings, call the situation to the attention of the COR and await a written decision.
- B. Plan and coordinate all work to proceed in an orderly and continuous manner without undue delay, and in conformance with the project schedule. Submit samples, shop drawings, schedules, insurance policies and certificates, and the like in time to avoid delays in actual construction. Coordinate electrical work so that work of each trade is completed before other construction begins which would obstruct it.
- C. Coordinate trades to ensure that proper clearances between work of the various trades allow access to items which require operation and maintenance.
- D. Coordinate location and elevation of all conduit, light fixtures, equipment, and appurtenances in such a manner that the finished installation is as indicated on drawings. In the event difficulties are encountered which prevent this, it is the Contractor's responsibility to bring this to the attention of the COR prior to initiation of work. Correct improperly coordinated installation at no additional cost.
- E. The Contractors' assistants shall include a competent electrical foreman, who shall be on the premises at all times to check, layout, coordinate and superintend the installation of work. The foreman shall establish all basic requirements relative to the work before starting, and be responsible for the accuracy thereof.

## 1.9 SUBMITTALS

### A. Manufacturers' and subcontractors' lists:

1. As specified in Division 01, submit a complete list of proposed manufacturers for all equipment, materials and subcontractors used for the work of this division. Lists shall follow the sequence of the specifications. No considerations will be given for partial or incomplete lists. After review of lists, submit shop drawings and product data.

### B. Shop drawings and product data:

1. Submit in accordance with the requirements of Division 01 or as established at the preconstruction conference, the required number of copies of Shop Drawings and Product Data for every item of equipment. Shop drawings or product data will not be considered until Manufacturers' Lists have been approved. Shop drawings and product data shall be submitted, as required by the General Conditions, with sufficient time for checking, return to Contractor, and resubmission as required before Contractor shall install any item.
2. Each item submitted shall be properly labeled, indicating the specific service for which the equipment or material is to be used, section and paragraph number of specification or drawing number to which it applies, Contractor's name and project name and number. Data submitted shall be specific and shall include product data and printed information in sufficient detail and scope to verify compliance with requirements of the contract documents. Clearly identify each item within the data. Data of a general nature will not be accepted. Each sheet must clearly show the project name and number.
3. The review of a shop drawing or product data shall not be considered as a guarantee of the measurements or building conditions or that the shop drawings or product data have been checked to see that item submitted properly fits the building conditions. This review shall not relieve the Contractor of the responsibility for furnishing material or performing work as required by the contract documents, for correctness of dimensions and quantities, or for proper coordination of details and interfaces among trades.
4. All exclusively electrical items furnished as items associated with mechanical items but not specifically described in the mechanical item submission, shall be submitted as a separate submittal but shall be clearly marked as associated with the mechanical item by identified specification paragraph.
5. Product data sheets shall be 8.5-inches by 11-inches cut sheets for operating and maintenance manual.

### C. Submit at least three copies of the results of every test required under any section in this division.

### D. Specialist shall submit a list of at least three projects similar to this project in type, size, and quality, which have been in place and operating satisfactorily for at least five years.

1. Include project name, address, name and phone number of Government's representative, and project type and size.

### E. After the work is completed, submit all required certificates of approval from approved inspection agencies and authorities having jurisdiction over work of this division. Certificates of approval must be received by the COR prior to final acceptance of the work.

## 1.10 SPECIALIST

- ### A. The term "Specialist" as used in the specification shall mean an individual or firm of established reputation (or, if newly organized, whose personnel have previously established a reputation in the

same field,) which is regularly engaged in, and which maintains a regular force of workers skilled in either (as applicable) manufacturing or fabricating items required by the contract, installing items required by the contract, or otherwise performing work required by the contract. Where the specification requires installation by a specialist, the term shall also be deemed to mean the manufacturer of the item, an individual or firm licensed by the manufacturer, or an individual or firm who will perform the work under the manufacturer's direct supervision.

#### 1.11 CONTRACT CLOSEOUT SUBMITTALS

##### A. Project record documents:

1. Maintain on site one set of the following record documents; record actual revisions to the work of this division:
  - a. Contract Drawings.
  - b. Specifications.
  - c. Addenda.
  - d. Change Orders and other Modifications to the Contract.
  - e. Reviewed shop drawings, product data, and samples.
2. Maintain record documents separate from documents used for construction.
3. Record information concurrent with construction progress.
4. Specifications: Legibly mark and record in each section a description of actual products installed, including the following:
  - a. Manufacturer's name and product model and number.
  - b. Product options, substitutions, or alternates utilized.
  - c. Changes made by addenda and modifications.
5. Record documents and shop drawings: Legibly mark each item to record actual construction, including:
  - a. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the work.
  - b. Field changes of dimension and detail.
  - c. Details not on original Contract Drawings.
6. Submit documents as specified in Division 01.

##### B. Operation and maintenance data:

1. Submit sets prior to final inspection as specified in Division 01. Unless otherwise specified in Division 01, submit no fewer than three sets. In addition to requirements specified in Division 01, submit operating and maintenance manuals for the work of this division as specified below.
2. Binders: Provide large enough binders, and sufficient quantity, that the required contents can be easily turned, removed, and reinserted.
  - a. Self-expanding fast lock type.
  - b. Three telescoping metal posts.
  - c. Durable plastic covers.
  - d. Angle spline with guide flanges.
  - e. Text page size - 8.5 by 11 inches.
  - f. Boorum and Pease, Stock No. C-619-3 expansion 3 inch to 5 inch or Stock No. C-1219

expansion 1.5 inch to 2.5 inch, or equal by National or Wilson Jones.

3. Prepare binder covers with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS," and title of project. Print on spine of binder "O & M INSTRUCTIONS." If more than one binder is required, print covers and spines with volume numbers. Include in the front of every binder an index to all binders.
4. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
5. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, typed on white paper.
6. Part 1: Directory, listing names, addresses, and telephone numbers of electrical engineers; contractor; electrical subcontractors; and major electrical equipment suppliers.
7. Part 2: Operation and maintenance instructions, arranged by specification section. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify the following:
  - a. Significant design criteria.
  - b. List of equipment.
  - c. Parts list for each component, including recommended spare parts list.
  - d. Operating instructions.
  - e. Maintenance instructions for equipment and systems.
  - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.
8. Part 3: Project documents and certificates, including the following:
  - a. Shop drawings and product data.
  - b. Photocopies of certificates.
  - c. Photocopies of warranties, guarantees, and bonds.
  - d. Test reports: Copies of the results of all tests required under all sections of specifications.
  - e. Photocopies of each panelboard circuit directory or directories for each panelboard provided, including panel name, panel location, panel ratings, spare circuit breakers and spaces for additional circuit breakers.
9. Submit one copy of completed volumes in final form 15 days prior to final inspection. This copy will be returned after final inspection, with Engineer comments. Revise content of documents as required prior to final submittal.
10. Submit final volumes revised, within ten days after final inspection.

#### 1.12 REGULATORY REQUIREMENTS

- A. When these specifications call for materials or construction of a better quality or larger sizes than required by the following codes and standards, the provisions of the specifications shall take precedence.
- B. Provide, without extra charge, any additional materials and labor which may be required for compliance with these codes and standards even though the work is not mentioned in these specifications or shown on the contract drawings.
- C. Perform the work of this division in strict accordance with the following authorities. The latest revision of these codes accepted by the authority having jurisdiction as of the date of the contract documents shall apply.
  1. The electrical, building, fire, and safety codes of the state and county or city in which the work

is being performed.

2. The National Electric Code, NFPA 70 (NEC).
3. The National Fire Protection Association Code. (NFPA)
4. International Building Code (IBC).
5. International Energy Conservation, Fire, and Electrical Codes (ICC).

#### 1.13 REFERENCE STANDARDS

- A. Perform the work of this division using the standards of the following organizations, as referred to in technical sections, as a minimum requirement for construction and testing. Unless specified otherwise in Bidding and Contract Documents or Division 01, the latest revision current as of the date of the contract documents shall apply.

1. Factory Mutual (FM)
2. Federal Specifications (FS)
3. Military Standards (Mil. Std.)
4. American National Standards Institute (ANSI)
5. American Society for Testing and Materials (ASTM)
6. International Code Council (ICC)
7. Institute of Electrical and Electronics Engineers (IEEE)
8. National Electrical Code (NEC) (NFPA 70)
9. National Electrical Manufacturer's Association (NEMA)
10. National Fire Protection Association (NFPA)
11. The Occupational Safety and Health Act (OSHA)
12. Underwriters Laboratory Inc. (UL)
13. American Association of State Highway and Transportation Officials (AASHTO)
14. American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)
15. Maryland Occupational Safety and Health Act (MOSHA)
16. Illuminating Engineering Society of North America (IESNA)

#### 1.14 TEMPORARY STORAGE

- A. Maintain upon premises, where directed, a storage area, and be responsible for all contents within these areas. Provide all security measures necessary for this area.
- B. Area shall be maintained and shall be returned to original condition at the completion of the project.
- C. Store electrical construction materials such as wire, raceways and boxes, devices, and equipment in buildings, enclosed trailers, or portable enclosed warehouses.
1. Materials and products subject to damage from moisture: Store in dry locations. If necessary, protect with protective wraps or covers.
  2. Plastics and other materials and products subject to damage from heat or cold: Store at manufacturer's recommended temperatures.
  3. Plastics and other materials and products subject to damage from sunlight: Protect from sunlight.
- D. Electrical equipment such as motor controllers, panelboards and circuit breakers stored before installation and installed during construction: Provide clean, dry locations at manufacturer's recommended temperatures, and cover or wrap if required to protect from incidental damage.

#### 1.15 PROTECTION



- A. Control dust resulting from construction work to prevent its spread beyond the immediate work area, and to avoid creation of a nuisance.
  - 1. Do not use water to control dust. Use drop cloths or other suitable barriers.
  - 2. In areas where dirt or dust is produced as a result of the work, sweep daily, or more often as required.
  - 3. Provide walk-off mats at entries and replace them at regular intervals.
  - 4. Construct dust partitions, where indicated on the drawings or as required.
  - 5. Protect areas occupied by Government personnel or equipment.
  - 6. Seal off all return air registers and other mechanical systems to prevent dust from entering.
- B. Each trade and subcontractor is responsible for preventing damage and soiling of work performed by other trades or subcontractors. Each trade and subcontractor is responsible for providing temporary protection of its own work.
  - 1. Protect work from spills, splatters, drippings, adhesives, bitumens, mortars, paints, plasters, and damage from welding or burning.
  - 2. Protect finished work from damage, defacement, staining, or scratching.
  - 3. Protect finishes from cleaning agents, or grinding and finishing equipment.
  - 4. Protect adjacent and finished work from damage, using tape, masking, covers or coatings and protective enclosures.
  - 5. Coordinate installations and temporarily remove items to avoid damage from finishing work.
- C. Repair all damage or soiling to the complete satisfaction of the COR; replace any materials or work damaged to such an extent that they cannot be restored to their original condition, all at no addition to the Contract sum.
- D. Protect work stored in place and supplies stored in the building.
  - 1. Store materials and products, subject to damage from moisture, in dry locations. If necessary, protect in wraps or covers.
  - 2. Store plastics, other materials, and products subject to damage from heat or cold at manufacturer's recommended temperatures.
- E. Protect electrical materials and products from weather events and accidents of construction.
- F. Use of sidewalk or roadway areas outside of the property lines shall be with permission and approval of the local authorities having jurisdiction.

#### 1.16 FIRE PROTECTION

- A. As a minimum, provide hand-carried, portable, UL-rated extinguishers with each work crew working inside the building.
- B. Select extinguishers in accordance with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

#### 1.17 PROJECT CONDITIONS

- A. Drawings showing utilities in concealed locations are based on the best information available but are not represented as being precisely correct. Work of the contract includes digging, cutting, drilling, using nondestructive methods, and other methods of locating concealed utilities in the field, as well as patching and repairing as specified in "Cutting and Patching" below.

B. If, in the course of the work, workers encounter a material they suspect to present some hazard:

1. Promptly notify the COR in writing.
2. Do not perform any work which would disturb the suspected material until written instructions have been received.

#### 1.18 WARRANTY

- A. All work and equipment provided as work of this division shall be fully warranted under the general project warranty. In addition, provide added special warranties as specified in individual sections.
- B. During the correction period, the Contractor shall promptly correct any work found to be defective or otherwise not in accordance with the requirements of the Contract Documents, on receipt of written notice from the COR. Except as otherwise required in General Conditions and Division 01, the correction period is one year after the date of substantial completion of the work. Work requiring correction shall promptly be repaired or completely replaced at no addition to the Contract Sum.
- C. When use of the permanent equipment has been permitted for temporary services during construction of the building, the warranty and correction periods shall nevertheless begin at the time of substantial completion, unless another date of acceptance has been agreed to by the Government.
- D. Special warranties are warranties required by individual specification sections, incidental product warranties, manufacturers' standard warranties, installer or subcontractor service agreements, and other individual warranties in addition to the general project warranty.
- E. Provide copies of warranties as required for Operation and Maintenance Manual specified above, and by Division 01.
- F. For items of work delayed beyond date of substantial completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

#### PART 2 - PRODUCTS

Not used.

#### PART 3 - EXECUTION

##### 3.1 CUTTING AND PATCHING

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
- B. Cut walls, floors, partitions, roofs, and other appurtenances for the passage or accommodation of conduits. Close superfluous openings and remove all debris caused by work of this division.
- C. No cutting of any structure or finish shall be done until the condition requiring such cutting has been examined and approved by the COR.
- D. New or existing surfaces disturbed as a result of such cutting or otherwise damaged shall be restored to match original work and all materials used for any patching or mending shall conform to the class of materials originally installed.

- E. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

### 3.2 TEMPORARY FACILITIES

- A. Temporary water facilities, electricity, telephone, toilet facilities, and temporary heat, shall be provided as specified in Division 01.

### 3.3 PROGRESS MEETINGS

- A. Progress meetings shall be held as specified in Division 01, and also when and if the Contractor or COR finds them necessary or advantageous to progress of work.
- B. Contractor, those subcontractors and those material suppliers concerned with current progress or with the scheduling of future progress, and the Government shall each be represented at these meetings by persons familiar with the details of work and authorized to conclude matters relating to work progress.

END OF SECTION 26 0101

## SECTION 26 0500 - COMMON WORK RESULTS FOR ELECTRICAL

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Requirements applicable to work of more than one section of Division 26.
- B. Testing wiring systems.

#### 1.2 RELATED SECTIONS

- A. Operation and Maintenance Manuals: Division 01 and Section 26 0101.

#### 1.3 DEFINITIONS

- A. Project correction period: A period after Substantial Completion of the work during which the Contractor shall correct every part of the work found to be not in accordance with the requirements of the contract documents, promptly after receipt of written notice.
- B. Qualified testing agency: A Nationally Recognized Testing Laboratory (NRTL), a National Voluntary Laboratory Accreditation Program (NVLAP), or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual sections; and where required by authorities having jurisdiction, that is acceptable to authorities.

#### 1.4 DESIGN REQUIREMENTS

- A. The drawings and system performances have been designed on the basis of using the particular manufacturers' products specified and scheduled on the drawings.
- B. Products of other manufacturers that are listed under the article "Available Manufacturers," or permitted as "equal," are permitted provided:
  - 1. Product shall meet the specifications.
  - 2. Contractor shall make, without addition to the contract sum, all adjustments for deviations so that the final installation is complete and functions as the design basis product is intended.
- C. Do not propose products with dimensions or other characteristics different from the design basis product that make their use impractical or cause functional fit, access, or connection problems.
- D. The contract drawings are generally diagrammatic, and do not indicate all fittings or offsets in conduit or all pull boxes, access panels, or other specialties required.
  - 1. Install conduit exposed to view parallel with the lines of the building and as close to walls, columns, and ceilings as may be practical, maintaining adequate clearance for access at parts requiring servicing.
  - 2. Install conduit a sufficient distance from other work to permit a clearance of not less than 0.5 inch (15 mm) between its finished covering and adjacent work.
  - 3. No conduit shall be run below the head of a window or door.
  - 4. Pull boxes and other appurtenances which require operation or maintenance shall be easily accessible. Do not cut or form handholes for operation or maintenance of appliances through walls or ceilings.

## 1.5 SUBMITTALS

- A. Test reports: Show that tests specified in Part 3 below demonstrate the specified results.

## 1.6 QUALITY ASSURANCE

- A. Provide materials and perform work in accordance with the electrical, building, fire, and safety codes and regulations of the state, county, or city in which the work is performed.
- B. Electrical control panels, equipment, materials and devices provided or installed as work of Division 26 shall bear UL label, or, if UL label is not available, the item shall be tested and labeled by a qualified testing agency, acceptable to authorities having jurisdiction, and in accordance with NFPA 70. Provide testing, if required, without addition to the contract sum.
- C. VOC content: Field-applied adhesives and sealants, limits per South Coast Air Quality Management District (SCAQMD), Rule No. 1168.
- D. Products shall contain no urea-formaldehyde content.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Electrical equipment backing panels: Plywood, DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated in accordance with AWPA C27, in thickness indicated, not less than 0.5 inch (13 mm) nominal.
  - 1. One side finished.
- B. Wood-preserved-treated lumber: Treated by pressure process, AWPA C2, with chemicals acceptable to authorities having jurisdiction, and marked with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
  - 1. Application: Treat items indicated on the drawings, and the following:
    - a. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, or waterproofing.
    - b. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry or concrete.
    - c. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
    - d. Wood framing members that are less than 18 inches (460 mm) above the ground in crawlspaces or unexcavated areas.
    - e. Wood floor plates that are installed over concrete slabs-on-grade.
- C. Aircraft cable: 0.25-inch (6-mm) steel wire rope, galvanized, construction 7 by 19 strands, minimum 7000 lbs (31138 N) breaking strength.

### 2.2 DATE-SENSITIVE EQUIPMENT

- A. Date-sensitive equipment: Systems, equipment, or components which use or process date and time data in order to perform their functions.

- B. Each item of date-sensitive equipment used in the project shall be warranted by the manufacturer to properly function and correctly use or process all time-related data for all dates and times which occur during a reasonable life expectancy of the equipment.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION OF PRODUCTS AND EQUIPMENT

- A. Manufacturers' instructions: Except as modified by drawings or specifications, install products and equipment in accordance with manufacturers' instructions and recommendations applicable to the project conditions.
  - 1. Immediately notify the COR if a difference or discrepancy is found between manufacturers' instructions and the drawings or specifications.
- B. Install plywood backing panels with finished face exposed.

#### 3.2 TESTS

- A. During the progress of the work and after completion, test the branch circuits and distribution system, and the low voltage alarm and signal systems.
- B. Results of the tests shall show that the wiring meets the requirements of this specification. Should any test indicate defect in materials or workmanship, immediately repair, or replace with new, the faulty installation, and retest the affected portions of the work.
- C. Furnish equipment and instruments necessary for testing.
- D. Tests shall demonstrate the following:
  - 1. Lighting, power, and control circuits are continuous and free from short circuits.
  - 2. Circuits are free from unspecified grounds.
  - 3. The resistance to ground of each non-grounded circuit is not less than one megohm.
  - 4. Circuits are properly connected in accordance with the applicable wiring diagrams.
  - 5. Circuits are operable. Demonstration shall include functioning of each control not less than ten times, and continuous operation of each lighting and power circuit for not less than 0.5 hour.
- E. Test circuit breakers larger than 100 amps at full voltage.
- F. Make voltage built-up tests with a voltage sufficient to determine that no short circuits exist.
- G. Immediately repair defects and retest until systems are operating correctly.
- H. Submit test reports.

#### 3.3 OPERATING INSTRUCTIONS

- A. Furnish the necessary technicians, skilled workers, and helpers to operate the electrical systems and equipment of the entire project for one 8-hour day.
- B. Where specified in technical sections, provide longer periods required for specialized equipment.
- C. Instruct the Government's designated personnel in operation, maintenance, lubrication, and

adjustment of systems and equipment.

D. The Operating and Maintenance Manual shall be available at the time of the instructions for use by instructors and Government personnel.

E. Schedule the general and specialized instruction periods for a time agreed upon by the COR.

END OF SECTION 26 0500

## SECTION 26 0504 - ELECTRICAL DEMOLITION

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Extent and location of demolition are shown on the drawings.
- B. Removal of items for reuse.
- C. Removal of fluorescent lamps without breaking them, and disposal to a recycler.

#### 1.2 RELATED SECTIONS

- A. Demolition: Division 02.

#### 1.3 SUBMITTALS

- A. Shop drawings: Demolition and removal procedures and schedules.
- B. Qualifications of fluorescent lamp recycler as required in the article "Quality Assurance" below.
- C. Project record documents:
  - 1. Record drawings.
  - 2. For fluorescent lamp disposal, records demonstrating that all the fluorescent lamps removed from the site have been received and accepted at the recycling facility. Receipt or bill of sale shall include the typewritten name and signature of the person responsible for receiving and logging in, and shall be dated.

#### 1.4 QUALITY ASSURANCE

- A. Demolition shall be carried out as expeditiously as possible, in accordance with accepted practice and applicable building code provisions.
- B. Fluorescent lamp recycler shall be in compliance with federal and state regulations applicable at its location, including licenses if required, to commercially recycle lamps and mercury-containing materials.

#### 1.5 HANDLING AND STORAGE

- A. Fluorescent lamps:
  - 1. Handle lamps so as not to break them. Store and ship in containers which prevent breakage during storage and shipping.
  - 2. Store lamps in secure location approved by the COR, until they are shipped to the recycler.
  - 3. The lamps are not defined as hazardous. If a few lamps should be broken accidentally, treat the debris as general construction debris.



## 1.6 PROJECT CONDITIONS

- A. If, in the course of the work, workers unexpectedly encounter a material not identified for special removal but which they suspect to be asbestos, to contain lead or PCBs, or to present some other hazard:
  - 1. Promptly notify the COR in writing.
  - 2. Do not perform any work which would disturb the suspected material until written instructions have been received.
- B. Protect adjacent materials indicated to remain. Install and maintain dust and noise barriers to keep dirt, dust, and noise from being transmitted to adjacent areas. Remove protection and barriers after demolition operations are complete.
- C. Locate, identify, and protect mechanical and electrical services passing through demolition area and serving other areas outside the demolition limits. Maintain services to areas outside demolition limits. When services must be interrupted, install temporary services for affected areas.

## PART 2 - PRODUCTS

Not used.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. In areas where lamp ballasts are to be removed, protect floors and other surfaces with plastic sheeting.
- B. Coordinate removal and storage of fluorescent lamps and ballasts. Protect lamps to prevent breaking them during removal.
- C. Protect existing building and equipment that is to remain, particularly to prevent entry of either dust or water. Ensure weathertightness at all times. Keep materials on hand to patch and maintain protection.

### 3.2 DEMOLITION

- A. Comply with demolition and disposal requirements of Division 02.
- B. Perform removal work neatly with the least possible disturbance to the building.
- C. Provide temporary barriers, danger signals, and appurtenances for protection of personnel and equipment during removal operations.
- D. Demolish, remove, demount, and disconnect inactive and obsolete conduit, fittings and specialties, equipment, and fixtures.
  - 1. Conduit and ducts embedded in floors, walls, and ceilings may be abandoned in place if they do not interfere with new installations. Cut back to at least one inch below finished surface.
  - 2. Remove materials above accessible ceilings.
  - 3. Disconnect and cap items to remain behind finished surfaces.

4. Patch and repair surface materials as required in Division 01 and Section 26 0101 article, "Cutting and Patching."

E. Remove the anchors, bolts, and fasteners associated with conduit and equipment to be removed.

### 3.3 ITEMS FOR REUSE

A. The following items shall be removed and reused as indicated or specified:

1. Lighting switches
2. Exit signs

B. Remove items to be reused in a manner to prevent damage. Pack or crate if required to protect the items from damage in storage.

### 3.4 REMOVAL OF FLUORESCENT LAMPS

A. Remove lamps without breaking them and pack in protective containers for shipment to recycler.

B. Prepare a record of lamps removed and prepared for shipment. This record shall be used to account for disposal of lamps to qualified recycler.

### 3.5 DISPOSAL

A. Dispose of equipment and materials removed, and rubbish and waste material, as work progresses. Do not allow demolition debris to accumulate on site. Remove products of demolition from the building daily.

B. Transport fluorescent lamps without breaking them and deliver to the recycler. Submit records of disposal as required in Part 1 above.

END OF SECTION 26 0504

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## SECTION 26 0519 - WIRES AND CABLES

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Wire and cable rated 600 V and less.
- B. Type AC cable is not permitted.

#### 1.2 RELATED SECTIONS

- A. Conduits: Section 26 0533.
- B. Voice and data communication cables: Section 27 1500.

#### 1.3 SUBMITTALS

- A. Product data:
  - 1. Each type of wire and cable, including accessories.
  - 2. Include copies of UL certifications showing compliance with requirements in "Quality Assurance" below.

#### 1.4 QUALITY ASSURANCE

- A. Electrical components, devices, and accessories: Listed and labeled as defined in NFPA 70 Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Products and installation shall comply with NFPA 70 and other applicable national, state, and local electrical codes.

### PART 2 - PRODUCTS

#### 2.1 LOW-VOLTAGE CONDUCTORS (600 V. MAX.)

- A. Conductors: Copper, 98 percent conductivity, rated for 75 degrees C, suitable for 600-volt duty, NEMA WC 70 Type THW, THWN, or THHN, solid for No. 10 and smaller and stranded for No. 8 and larger and when specifically noted.
- B. Conductor identification: Markings along outer braid denoting conductor size, type of insulation, and manufacturer's trade name, and color code. Identification shall extend to branch circuits and outlets. Use the color coding system tabulated below throughout the building's network of feeders and circuits, unless otherwise required by the authority having jurisdiction.
  - 1. Colors on conductors No. 10 and smaller, or No. 6 and smaller for grounded and grounding conductors: Solid colored insulation.
  - 2. Colors on conductors No. 8 and larger, or No. 4 and larger grounded and grounding conductors: Colored tape wrapped a minimum of 6 inches (150 mm) on either end of conductor.

COLOR CODE				
VOLTAGE	NEUTRAL	PHASE		
		A	B	C
120-V, 2 wire	White	Black, Red, or Blue, depending on phase		
208/120-V wye, 3-phase, 4-wire	White	Black	Red	Blue
277-V, 2-wire	Gray	Brown, Orange, or Yellow, depending on phase		
480/277-V wye, 3-phase, 4-wire	Gray	Brown	Orange	Yellow

- C. Wires used solely for grounding purposes shall be green, if insulated. Insulated equipment ground conductors for isolated ground type receptacle circuits shall be green with a yellow strip.
- D. Control wiring shall be coded with colors different from those used to designate phase wires.

## 2.2 WIRING ACCESSORIES

- A. Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service where installed.
- B. Twist-on wire connectors (dry locations): Color-keyed, Ideal Industries, Inc., Wingnut®, 3M Company "Scotchlok", or equal by King Innovation.
- C. Twist-on wire connectors (damp and wet locations): Ideal Industries, Inc., UnderGround®, models 60, 64, or 66 as appropriate; King Innovation DryConn®; or equal by 3M Company. Connectors shall be listed under UL 486D.
- D. Compression connectors: Color-keyed, 3M Company "Scotchlok"™ compressor connectors, "10000" series for copper conductors[, "20000" series for aluminum conductors,] or equal by Thomas & Betts (Blackburn) or IlSCO.
- E. Compression connectors (damp and wet locations): Protect the connector's with a waterproof system, UL-listed for direct burial and 600 volts: 3M Company 8420 series, Thomas & Betts Model DBSK82, or equal by IlSCO.
- F. Compression taps: Series CT-2 tap with CT-2C cover, or Series 54710 color-keyed compression taps, Burndy Corporation "Versitap" or equal by OZ/Gedney.
- G. Power distribution blocks: Equal to FCI Burndy "U-Blok."

## 2.3 PLENUM CABLES

- A. Plenum cable: Insulated with material equal to Dupont "Teflon FEP," UL classified for low flame and smoke-spread characteristics, for use in plenum areas without conduit in accordance with the requirements of NFPA 70.

1. Communications cable: Type MPP or CMP in accordance with NFPA 70.

#### 2.4 TYPE MC CABLE

- A. Metal-clad cable: NEMA WC 70 Type MC, copper, 600-V multiconductor with ground conductor. Solid copper No. 10 and smaller, stranded copper No. 8, conforming to ASTM B 3 or B 8.
- B. Fittings: Steel or malleable iron, equal to Appleton Electric Products.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION, GENERAL

- A. Provide wiring indicated in accordance with national, state, and local electric codes.
- B. Install wire and cable in raceways.
- C. Wire and cable not installed in raceways:
  1. Support from building structure; do not support from ceiling supports, ceilings, or other utilities.
  2. Support no less than every 4 feet (1220 mm).

#### 3.2 INSTALLING INTERIOR WIRING

- A. Sizes and locations: Minimum sizes shall be as follows, unless a larger size is indicated on the drawings.
  1. 120-V branch circuits, except as specified below:
    - a. Homerun from first outlet to panel: No. 12 when run is 50 feet (15,000 mm) or less; No. 10 when run is between 50 feet (15,000 mm) and 100 feet (30,000 mm); No. 8 when run is more than 100 feet (30,000 mm).
    - b. First outlet to other outlets: No. 12.
  2. Exit light and emergency lighting circuits: No. 10. Do not install in raceways, outlet boxes, or other locations with any other wiring system.
  3. Any system: Minimum No. 12 unless specified or shown on drawings to be smaller.
- B. Splicing shall be done in outlet boxes and junction boxes and not in conduit.
  1. Conductors No. 8 and larger: Terminated, spliced and taped, wherever practical, with compression connectors or solderless connectors. Use tools recommended by the manufacturer.
  2. Splices in conductors No. 10 and smaller, including lighting fixtures: Made with wire connectors.
  3. Taps in conductors No. 6 and larger: Made with compression taps or power distribution blocks.
- C. Wiring in fluorescent fixture channels and in other high ambient temperature areas shall be of types required by NFPA 70.
- D. Wires shall be neatly shaped in panels, troughs, boxes, and appurtenances.

### 3.3 COORDINATION WITH DEVICES AND EQUIPMENT

- A. Where conductor size or parallel conductors shown on drawings connect to terminals on devices or equipment which is not sized for the connection:
  - 1. Provide a junction box as near the equipment as possible but no more than 10 feet (3 m) away. Obtain approval of location before installing.
  - 2. Provide conductor(s) sized to the ampacity of the equipment, from equipment to junction box.
  - 3. In the junction box, splice the conductors from the equipment to the conductors of sizes, or parallel conductors, shown on the drawings.

### 3.4 INSTALLING CABLE RATED BELOW 100 VOLTS

- A. Install in conduit in walls, in concrete floors, above inaccessible ceilings, where exposed, and wherever it may not be accessible or may be subject to physical damage. Otherwise, install above accessible suspended ceilings and attached to building structure with approved standoff insulated clamps.
- B. Cable routes shall avoid hot utilities which might adversely affect the system's performance or result in damage to the cable. If cable must be placed close to such utilities, keep it separate and protect with insulation.
- C. Do not run cable in hangers used for pipes, electric conduits, or ceiling hangers, nor support it in any way by attachments to pipes, conduits, or ceiling hangers.
- D. Provide separate conduit systems for each low-voltage system.
- E. Each cable run shall contain an S loop or other means to accommodate expansion or contraction.
- F. Cable bends shall have a radius not less than the value recommended by the cable manufacturer.
- G. Tag cables connected to electronic equipment, to show function and the location of other end. Securely fasten labels to the cable.
- H. Where ceiling plenums are used for passage of air by heating and air conditioning system, install low-voltage cables and wiring in conduit or use UL listed plenum cable.

### 3.5 INSTALLING MC CABLE

- A. Install in compliance with NFPA 70.
- B. Locations: In drywall partitions and above ceilings. Do not install in masonry partitions or walls.
- C. Connect cable with wiring accessories specified above.
- D. Cable larger than No. 8 shall not be permitted.
- E. MC cable run to switches shall have a neutral conductor. This conductor is not indicated on the drawings.
- F. Homerun from panelboard to first outlet or switch: Wire in EMT or IMC raceway.

- G. Runs shall be minimized to 72 inches or less for hollow wall partitions or for lighting fixture whips.  
All other locations shall be wired in EMT or IMC raceway.

END OF SECTION 26 0519



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## SECTION 26 0521 - WIRING CONNECTIONS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Power and control wiring for equipment.

#### 1.2 RELATED SECTIONS

- A. Equipment: Installed items requiring electricity, specified in other sections or shown on drawings.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Conduits, wires and cables, devices, and accessories as specified in other sections.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Except where provided with equipment, furnish and install manual pushbutton stations and pilot lights, with wiring. Where stations and pilot lights are grouped at central locations, mount them under a common faceplate.
- B. Rough in and connect to equipment furnished under other sections and equipment furnished by the Government. Make connections as indicated on drawings with exact locations and details determined by approved shop drawings of the equipment.
  - 1. Under equipment sections, equipment will be set in position and the electrical devices and components furnished loose. Assemble, install, and wire under this section.
  - 2. Accomplish rough-in from walls with flush outlet boxes and from floors by means of conduit couplings finishing flush with finished floor.
- C. Certain equipment, as indicated, will be furnished with control panels and auxiliary control components. Mount the panels, furnish and install source wiring and disconnects, and completely connect controls and motors.

END OF SECTION 26 0521

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## SECTION 26 0526 - GROUNDING AND BONDING

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Grounding and bonding electrical systems and equipment.
- B. Ground system test.

#### 1.2 REFERENCES

- A. ANSI/TIA/EIA J-STD-607
- B. IEEE STD 142
- C. NFPA 70
- D. ASTM F467 and F468
- E. UL 467

#### 1.3 SUBMITTALS

- A. Product data: Ground rods and connections
- B. Certifications: System test.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURED UNITS

- A. Ground conductor, unless specifically noted otherwise, shall be copper, 98 percent conductivity, solid for No. 10 AWG and smaller and stranded for No. 8 AWG and larger.
  - 1. Isolated equipment grounding conductors shall have green insulation with a yellow stripe, or shall be identified as specified in Part 3.
- B. Mechanical type ground connectors:
  - 1. Connectors: IEEE 837 and UL 467 compliant, equal to FCI Burndy G Series, listed for use for specific types, sizes, and combinations of conductors and connected items.
  - 2. Nuts, bolts, and washers: Silicon bronze alloy type B per ASTM F467 and F468.
- C. Exothermic type ground connections: Exothermic welding systems shall be equal to "Cadweld," manufactured by Erico International Corporation.
- D. Lugs: Lugs shall be two- or four-hole, equal to Burndy Hylug series.

### PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Provide the complete grounding of conduit systems, electrical equipment, conductor and equipment enclosures, motors, transformers, and neutral conductors in accordance with applicable codes. Grounded phase and neutral conductors shall be continuously identified. Continuity of metal raceways shall be insured by double locknuts.

### 3.2 EQUIPMENT GROUNDING AND BONDING

- A. Provide insulated equipment grounding conductors to all feeders and branch circuits.
- B. Air-duct equipment circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
- C. Water heater, heat tracing, and antifrost heating cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat tracing cable. Bond conductor to heater units, piping, connected equipment, and components.
- D. Isolated grounding receptacle circuits shall be provided with an additional equipment grounding conductor insulated from the normal equipment grounding conductor.
  - 1. Provide an isolated equipment grounding conductor for connection to the isolated ground type receptacle's grounding terminal. The isolated equipment grounding conductor shall be in addition to the system equipment grounding conductor used to bond the outlet box to the grounding system.
  - 2. Multiple isolated ground type receptacles on a single circuit may use a common insulated equipment ground conductor for connection to the grounding terminals.
  - 3. Terminate the circuit's insulated equipment grounding conductor in the circuit's originating panelboard on an insulated equipment ground bar (insulated from the panel's normal equipment ground bar and panel enclosure).
  - 4. Provide an insulated equipment grounding conductor from the panel's insulated equipment ground bar to the originating system's (service or separately derived system) neutral terminal. This conductor shall follow the route of the panel feeder through any intervening distribution equipment to the originating system.
  - 5. Insulating equipment grounding conductors that do not have insulation as described in Part 2 shall be marked (where visible to normal inspection) with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.

### 3.3 IDENTIFICATION

- A. Comply with requirements in Section 26 0553, Identification for Electrical Systems, for instruction signs. The label or its text shall be green.

### 3.4 GROUNDING SYSTEM TEST

- A. Ensure that grounding system is continuous and that resistance to earth is not more than 10 ohms.
- B. Test each ground rod for resistance to earth before making connections to rod; tie grounding system together and test for resistance to earth.
- C. Make resistance measurements in dry weather, not earlier than 48 hours after rainfall.

- D. Submit written results of each test including location of rods as well as resistance and soil conditions at time measurements were made.

END OF SECTION 26 0526

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## SECTION 26 0533 – CONDUITS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Conduit and accessories, aboveground.

#### 1.2 RELATED SECTIONS

- A. Firestopping: Division 07.
- B. Boxes: Section 26 0534.

#### 1.3 DEFINITIONS

- A. FMC: Flexible metal conduit.
- B. LFMC: Liquid-tight flexible metal conduit.

#### 1.4 SUBMITTALS

- A. Product data:
  - 1. Each type of conduit included in the work, and related fittings.
  - 2. Accessory materials.
  - 3. Hangers and fasteners.

### PART 2 - PRODUCTS

#### 2.1 AVAILABLE MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following:
- B. Steel conduit and tubing:
  - 1. AFC Cable Systems, Inc. (FMC and LFMC)
  - 2. Allied Tube & Conduit; a Tyco International Ltd-Co.
  - 3. O-Z/Gedney, Unit of General Signal
  - 4. Wheatland Tube Co.
  - 5. Or approved equal.
- C. Steel conduit fittings:
  - 1. Appleton Electric Co.
  - 2. Cooper Crouse-Hinds.
  - 3. Hubbell, Inc.; Killark Electric Manufacturing Co.
  - 4. O-Z/Gedney; Unit of General Signal.
  - 5. Spring City Electrical Manufacturing Co.
  - 6. Thomas & Betts Corporation.
  - 7. Or approved equal.
- D. Nonmetallic conduit, tubing and fittings:



1. Allied Tube & Conduit; a Tyco International Ltd. Co.
2. Arnco Corp.
3. Beck Manufacturing
4. CANTEX Inc.
5. Certainteed Corp.; Pipe and Plastics Group
6. Lamson & Sessions; Carlon Electrical Products
7. Or approved equal.

E. Wiring troughs and fittings:

1. Hoffman Engineering Co.
2. Lamson & Sessions, Carlon Electrical Products
3. Square D Schneider Electric
4. Or approved equal.

F. Conduit hangers and supports:

1. Thomas & Betts "Kindorf"
2. Tyco Power-Strut
3. Unistrut Diversified Products
4. Or approved equal.

G. Fasteners:

1. Caddy Fasteners by Erico Products Inc
2. ITW Ramset "Red Head"
3. Wej-It Fastening Systems
4. Or approved equal.

## 2.2 CONDUIT AND FITTINGS

A. Galvanized steel conduit: Hot-dip galvanized with threads galvanized after cutting, one of the following:

1. Intermediate steel conduit (IMC) conforming to UL 1242 and ANSI C80.6.

B. Steel conduit fittings: Cast malleable iron fittings with smooth finish and full threaded hubs. Include steel or malleable iron locknuts, bushings, and other fittings.

1. Insulating bushings: Equal to Thomas & Betts Series 22.
2. Hub fittings with recessed sealing ring and nylon insulated throat equal to Thomas & Betts Series 370.
3. Fittings for exposed locations: Conduit outlet bodies, zinc or cadmium plated.

C. Electrical metallic tubing (EMT): Hot-dip galvanized or sherardized thin-wall steel conduit conforming to UL 797 and ANSI C80.3.

D. Connectors and couplings for EMT: Concrete- or rain-tight, compression or type, made of zinc- or chromium-plated steel. Connectors shall have nylon insulating throats.

1. Compression connector equal to Thomas & Betts No. 5223.
2. Compression coupling equal to Thomas & Betts No. 5220.

- E. Flexible metal conduit (Type FMC): Made of sheet metal strip, interlocked construction, conforming to UL 1.
- F. Liquidtight flexible metal conduit (Type LFMC) shall conform to UL 360.
- G. Connectors for flexible metal conduit: Equal to angle wedge “Tite-Bite” with nylon insulated throat, Thomas & Betts Series 3110 and 3130.
- H. Liquidtight type connectors: UL 14814A. Fittings: With nylon insulated throat, equal to Thomas & Betts Series 5331.
- I. Plastic conduit: Polyvinyl chloride (PVC) Schedule 40, rated for use with 90-degree conductors, for exposed, underground, and encased applications, complying with NEMA Specification TC-2 and UL 651.
- J. Plastic conduit fittings and cement:
  - 1. Fittings: Complying with NEMA TC 3 and UL 514.
  - 2. Cement: Solvent cement made by the manufacturer of the conduit and fittings.
- K. Weatherproof expansion fittings: With bonding jumpers, equal to O-Z/Gedney types AX and TX.

## 2.3 SLEEVES FOR RACEWAYS

- A. Steel pipe sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
  - 1. Sleeves for exterior walls: Anchor flange welded to perimeter.
- B. Sleeves for rectangular openings: Galvanized sheet steel of length to suit application. Minimum thickness:
  - 1. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and no side more than 16 inches (400 mm): 0.052 inch (1.3 mm).
  - 2. For sleeve cross-section rectangle perimeter equal to or more than 50 inches (1270 mm) and 1 or more sides equal to or more than 16 inches (400 mm): 0.138 inch (3.5 mm).
- C. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07.

## 2.4 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and conduit.
  - 1. Sealing elements: EPDM or NBR interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
  - 2. Pressure plates: Stainless steel. Include two for each sealing element.
  - 3. Connecting bolts and nuts: Stainless-steel of length required to secure plates to sealing elements. Include one for each sealing element.

## 2.5 ACCESSORY MATERIALS

- A. Pull rope: Polypropylene, thickness, tensile strength, and work load selected to meet project load requirements.
- B. Caps and plugs: Equal to Thomas & Betts Series 1470.
- C. Lubricant: Equal to Ideal Industries, Inc. "Yellow 77". UL approved.
- D. Bituminous protective coating: Coal tar based, self-priming on steel, applied in a wet film thickness at least 22.0 mils (559 microns) per coat.
- E. Rust inhibitive paint: Alkyd based, equal to Benjamin Moore Super Spec HP D.T.M. Alkyd Low Lustre P23; white, black, or bronzetone; applied in a wet film thickness of at least 2.9 mils.

## 2.6 CONDUIT HANGERS

- A. Adjustable hangers: Equal to Kindorf C-711 lay-in hanger or C-710 Clevis hanger.
- B. Trapeze hangers: Constructed of channels with Kindorf C-105 notched steel straps.
- C. Channels: Steel, 1.5 inches (38 mm) wide with 7/8-inch (22-mm) continuous slot, gages and weights equal to Kindorf B-900 series.
- D. Beam clamps: Equal to Kindorf E-160 or U-569 adjustable type, for connecting hanger rod to steel beam.
- E. Hangers for conduit 1.0 inch (27 mm) and smaller, through or below bar joists: "Hang-on" hangers attached to joists with Minerallac scissor clips or two-piece stud clips.
- F. Finish: All hangers, assemblies, plate washers, rods, locknuts, channels, bolts, and appurtenances shall be hot-dip galvanized.

## 2.7 FASTENERS

- A. General: Select fasteners such that load applied does not exceed one-fourth of manufacturer's load capacity in 3500 psi (24000 kPa) concrete.
- B. Fasteners to concrete: Self-drilling type expansion anchors, or machine bolt drop in anchors for drilled holes. Fasteners to concrete ceilings shall be vibration- and shock-resistant.
- C. Fasteners to drywall or cavity wall: Toggle bolts, hollow-wall drive anchors, or nylon anchors as required.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Provide complete, separate and independent raceway system for each of the various wiring systems including, but not limited to, the following:
  - 1. Lighting
  - 2. Power
  - 3. Exit Lighting\*
  - 4. Emergency Lighting System\*
  - 5. Fire Alarm System

6. Low Voltage Control System
7. Control Wiring
8. Voice and Data Systems
9. Security Systems

\*These wiring systems may be installed in common raceways.

- B. Wire all raceway systems completely, except where otherwise indicated, as shown on drawings and as required for satisfactory operation of each system.
- C. Where wiring troughs are required or used to facilitate the installation, amply size them to accommodate conductors, in accordance with NFPA 70.
- D. Types and locations of conduits are scheduled at the end of the section.
- E. Do not install conductors or pull rope during installation of conduit.
- F. Where conduit is connected to a cabinet, junction box, pull box, or auxiliary gutter, protect the conductors with an insulating bushing. Provide locknuts both inside and outside the enclosure. Where conduit is stubbed up to above ceilings for future wiring, close ends with bushings.
- G. Rust-inhibitive paint:
  1. Exposed threads of exterior conduit.
  2. All unfinished metal components.
- H. Make turns in conduit runs with manufactured elbows or using machines or tools designed to bend conduit. Turns shall be not less than the various radii permitted by NFPA 70.
- I. Sizes:
  1. Do not use conduit smaller than 0.75 inch (21 mm), except where otherwise indicated.
  2. Feeder conduits shall be as large as indicated, or as required by NFPA 70 (whichever is larger). Do not install more than one feeder in a single conduit.
  3. Conduit sizes shown on drawings are based on Type THHN/THW wire.
- J. Make vertical runs plumb and horizontal runs level and parallel with building walls and partitions.
- K. Ground conduits as required by NFPA 70.
- L. Where conduits pass through building expansion joints, and wherever relative movement could occur between adjacent slabs, equip with weatherproof expansion fittings and bonding jumpers.
- M. Run conduits concealed in new construction except where connecting to surface-mounted cabinets and equipment, and in electrical and mechanical equipment spaces. Install conduit above suspended ceilings and within walls and partitions.
- N. Immediately after each run of conduit is completed, test it for clearance, smooth the joints, and close at each end with caps or plugs to prevent entrance of moisture or debris.
- O. Conduit installed at indoor locations exposed to continuous or intermittent moisture shall provide a liquidtight seal. Use steel or malleable iron hub fittings. Coat exposed threads with bituminous protective coating.

P. Install no conduit in these locations:

1. Setting beds for terrazzo or tile.
2. Concrete toppings, unless specifically approved by Structural Engineer.

3.2 INSTALLING PULL BOXES, JUNCTION BOXES, OUTLET BOXES

- A. Install as specified in Section 26 0534, Boxes.
- B. Install pull or junction boxes in long runs of conduits or where necessary to reduce the number of bends in a run.
1. Select inconspicuous locations. Do not install until locations have been approved by the COR.
  2. Install boxes flush with wall or ceiling surfaces, with flat covers. Where removable ceiling units are used, locate boxes above ceilings.
- C. Verify door swings with door frame installed before locating switch outlets.

3.3 INSTALLING FLEXIBLE CONDUIT

- A. Installation shall comply with NFPA 70.
1. Minimum length: Two feet (610 mm).
  2. Maximum length: Six feet (1830 mm).
- B. Make immediate connections to recessed lighting fixtures, speakers, and other equipment in suspended ceilings with flexible metal conduit. Include sufficient slack to permit removal of fixture or equipment.
- C. Make immediate connections to motors and transformers with liquidtight flexible conduit. Include sufficient slack to reduce the effects of vibration.
- D. In wet locations, install liquidtight type, in such a manner that liquid tends to run off the surface and not drain toward the fittings.
- E. Where fittings are brought into an enclosure with a knockout, install a gasket assembly consisting of an O ring and retainer on the outside.

3.4 INSTALLING PULL ROPE AND CONDUCTORS

- A. After conduit is installed, fish pull rope. After completion of the work of this project, pull rope shall remain in conduits identified as to be left empty.
- B. Do not use a pull rope that has a tensile strength of more than one of the conductors of a two-wire circuit, more than two of the conductors of a three-wire circuit, or more than three of the conductors of a four-wire circuit.
- C. Do not pull conductors into the conduits until the system is entirely completed and wet building materials are dry.
- D. Use only a lubricant approved for use with conductor materials and pull rope materials.

3.5 INSTALLING SLEEVES

- A. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07.
- B. Concrete slabs and walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Fire-rated assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- D. Cut sleeves to length for mounting flush with both surfaces of walls.
- E. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level.
- F. Size pipe sleeves to provide 0.25-inch (6.4-mm) annular clear space between sleeve and raceway unless sleeve seal is to be installed.
- G. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.
- H. Interior penetrations of non-fire-rated walls and floors: Seal annular space between sleeve and raceway, using joint sealant appropriate for size, depth, and location of joint.
- I. Fire-rated-assembly penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway penetrations. Install sleeves and seal with firestop materials. Comply with Division 07.

### 3.6 INSTALLING CONDUIT HANGERS

- A. Single runs of overhead conduits 1.25-inch (35-mm) size and larger shall be supported by adjustable hangers, using 0.375-inch (10-mm) rods for conduits up to 2.0 inch (53-mm) size and 0.5-inch (13-mm) rods for conduits larger than 2.0 inches (53 mm).
- B. Support groups of conduits run in parallel on trapeze hangers suspended from 0.5-inch (13-mm) hanger rods.
- C. Space hangers not over 5 feet (1.5 m) apart for non-metallic conduits, and not over 10 feet (3 m) apart for metal conduits. Support conduits within 3 feet of each outlet, junction or pull box.
- D. Below bar joist construction, support hangers from a length of structural channel, welded to the top chords of at least two joists.
- E. Where large numbers of conduits are grouped together, stagger individual hangers so as not to concentrate the load on a few joists.
- F. Where hanger rods are attached to structural beams, use adjustable beam clamps.
- G. Below precast plank construction, hanger rods shall pass through the precast planks and be secured on top side with nut, locknut and plate washer. Plate washers shall be at least 4 inches (102 mm) square and 0.125 inch (3.2 mm) thick. Top of hanger assembly shall be concealed in the concrete fill which will be placed over the planks.
- H. Attach hanger rods to concrete with expansion bolts and anchors.

### 3.7 INSTALLING CONDUIT IN DEMOUNTABLE PARTITIONS

- A. Wiring to outlets in demountable partitions and columns shall be fed from junction boxes above suspended ceilings. Do not run conduit to demountable partitions in concrete slabs or topping.
- B. Fish flexible conduit through the metal stud partitions, column closures, or wireways of the demountable partitions. This flexible conduit may be 0.5 inch size and the installation shall be as recommended by the partition manufacturer.
- C. Wireways of the demountable partitions may be used to install cables if they are UL approved for this service, and are not being used for other services.

### 3.8 CONDUIT IN EXISTING BUILDING

- A. Remove superfluous electrical equipment and cap outlets not being used, as specified in Section 26 0504, Electrical Demolition.
- B. In existing areas that are being renovated it is the intent to show on the drawings what the finished areas will contain when completed. Except as specified otherwise, existing conduit, and outlet boxes may be reused where they meet specifications and code requirements. Replace existing products or materials which are not suitable for reuse as determined by the COR.
- C. Suitably cap superfluous concealed outlets, and remove unused wire. Remove superfluous raceways exposed in finished areas, and abandon superfluous raceways concealed in walls.
- D. Install wiring in existing building concealed wherever possible above ceilings, in new walls, and in existing furred spaces. In secondary rooms, such as storerooms, install in EMT.

### 3.9 SCHEDULE OF LOCATIONS

- A. IMC with screw joint couplings:
  - 1. Conduits in crawl space, for fire alarm system and security system.
- B. EMT:
  - 1. Sizes 4 inches (102 mm) and smaller except as noted above.

END OF SECTION 26 0533

## SECTION 26 0534 – BOXES

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Boxes with covers.

#### 1.2 RELATED SECTIONS

- A. Conduits: Section 26 0533.
- B. Wiring devices: Section 26 2726.
- C. Outlet boxes where required for special systems: Provided by the equipment manufacturers of the various systems.

#### 1.3 SUBMITTALS

- A. Product data: Each type of box included in the project.

### PART 2 - PRODUCTS

#### 2.1 AVAILABLE MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following:

- B. Boxes:

- 1. Appleton/EGS Electrical Group
- 2. RACO/Hubbell Electrical Products
- 3. Steel City/Thomas & Betts
- 4. Or approved equal.

- C. Poke-through fittings:

- 1. Hubbell, Inc. Kellems
- 2. Mono-systems, Inc.
- 3. Steel City/Thomas Betts
- 4. Wiremold

#### 2.2 MATERIALS

- A. Outlet, switch, and junction boxes:

- 1. Sheet metal: NEMA OS 1, sherardized or galvanized stamped.
- 2. Cast-metal, where required for exposed locations: NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

#### 2.3 BOXES FOR WALLS AND PARTITIONS

- A. Outlet boxes in concrete construction: Octagonal, two-piece type, of sufficient depth to keep conduits not closer than 1 inch (25 mm) to surface.



- B. Switch and receptacle boxes in masonry partitions and walls: Square cornered tile wall boxes 3.5 inches (90 mm) deep, or four-inch (100-mm) square boxes with raised tile wall device covers. The device covers shall be of extra depths required to suit the block or brick construction in which they are placed.
- C. Switch and receptacle boxes in metal stud partitions: 4 inches (100 mm) square by 1.5 inches (38 mm) deep boxes with 0.75-inch (19-mm) raised tile wall device covers finishing flush with finished wall surface.
- D. Wall- and partition-mounted outlets for low-voltage systems: Same as specified above for switches and receptacles.

#### 2.4 JUNCTION AND PULL BOXES

- A. Junction and pull boxes in feeder conduit runs: Galvanized, of size required for conduit arrangement and not less than the size required by NFPA 70, and furnished with screwed covers.

#### 2.5 POKE-THROUGH SERVICE FITTINGS FOR POWER AND COMMUNICATION

- A. Equal to Wiremold Evolution Series 6.-inch Poke-Through, listed by UL and classified for fire resistance up to and including two-hour fire rating. Units shall have one 0.75-inch and one 1.25-inch EMT conduits feeding into bottom of housing. Provide units with wiring devices and face plates as detailed on the drawings, suitable for each location.

#### 2.6 WALL BOX SERVICE FITTINGS FOR POWER AND COMMUNICATION

- A. Equal to Wiremold Evolution Series Wall Box EFSB, 4 listed by UL. Units shall have on 0.75-inch and one 1.25-inch EMT conduits feeding into top and bottom of housing. Provide units with wiring devices and face plates las detailed on the drawings, suitable for each location.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Provide box at each outlet, switch, and appurtenance. Each box shall be of a type suitable for the duty intended and shall be installed in accordance with the manufacturer's instructions.
  - 1. Where conduit is exposed, provide cast-steel boxes.
- B. Coordinate locations of boxes with installation of conduit as specified in Section 26 0533.
- C. Do not install boxes back-to-back (through the wall) in partitions.
- D. Firmly secure the boxes in place, plumb, level, and with front of device cover even with finished wall surface.
- E. Boxes in metal stud walls or partitions shall be securely supported by metal channels spanning between two studs and attached to same.
- F. In demountable partitions, coordinate the installation of the outlets and wiring with the partition supplier. Provide necessary hardware and accessories for the proper installation. Provide special shaped and sized boxes for outlets in demountable partitions, suited to the space available in the partition.

- G. Outlet boxes used for supporting lighting fixtures: Furnish with malleable iron fixture studs of “No-Bolt” type, secured by locknut. Provide structural channel supports for boxes occurring in ceilings. Outlets in ceilings directly on bottom of joists shall be supported independent of ceiling construction. Outlets in suspended ceilings shall not be supported from ceiling construction. Special supports for boxes shall be as directed and approved by the COR.
- H. Where service fittings will not permit ganging of boxes for floor outlets, outlets shall be as close as practical.
- I. Provide a single cover plate where two or more devices are grouped together in one box.
- J. Verify door swings with door frame installed before locating switch outlets.
- K. Outlet boxes in fire-rated assembly:
  - 1. Clearance between boxes and wallboard shall not exceed 0.125 inch (3.2 mm).
  - 2. Surface area of individual outlet box does not exceed 16 square inches (103 sq cm).
  - 3. Entire surface area of boxes shall not exceed 100 square inches (645 sq cm) per 100 square feet (9.3 sq m) of wall surface.

### 3.2 IDENTIFICATION

- A. Identification on outside covers of pull and junction boxes in ceiling space or exposed on walls: Paint with colored enamel or mark with permanent waterproof black marker, or both, as specified.
  - 1. Fire alarm system: Red.
  - 2. Other special systems: Mark with system type, such as Data and Security.
  - 3. Power and lighting: Panelboard designation and circuit number(s).

END OF SECTION 26 0534

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## SECTION 26 0553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This section includes electrical identification materials and devices required to comply with ANSI, NFPA, and OSHA standards.
- B. This section addresses identification of electrical equipment, raceways, boxes, conductors, and other related electrical system components.

#### 1.2 SECTION INCLUDES

- A. Identification for raceways and cables.
- B. Identification of power conductors and control cables.
- C. Identification of equipment and instructions.
- D. Miscellaneous identification products.

#### 1.3 RELATED SECTIONS

- A. Sections in Divisions 26, 27 and 28.

#### 1.4 REFERENCES

- A. ANSI A13.1: Scheme for the Identification of Piping Systems.
- B. ANSI Z535.4: Standard for Product Safety Signs and Labels.
- C. ANSI/IEEE C2: National Electrical Safety Code.
- D. NFPA 70: National Electrical Code.
- E. NFPA 70E: Standard for Electrical Safety in the Workplace.
- F. OSHA 29 CFR 1910.144: Safety Color Code for Marking Physical Hazards.
- G. OSHA 29 CFR 1910.145: Specifications for Accident Prevention Signs and Tags.
- H. UL 969: Standard for Marking and Labeling Systems.

#### 1.5 SUBMITTALS

- A. Product data: For each type of electrical identification product.

#### 1.6 QUALITY ASSURANCE

- A. Comply with ANSI A13.1 and IEEE C2.
- B. Comply with NFPA 70.

- C. Comply with OSHA standards.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

#### 1.7 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other sections requiring identification applications, drawings, shop drawings, manufacturer's wiring diagrams, and the operation and maintenance manual; and with those required by codes, standards, and safety regulations. Use consistent designations throughout Project.
- B. Coordinate installation of identification materials and devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identification materials and devices with location of access panels and doors.
- D. Install identifying materials and devices before installing acoustical ceilings and similar concealment.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following manufacturers, or approved equal:
  - 1. Brady USA, Inc.
  - 2. Carlton Industries
  - 3. Graphic Products, Inc.
  - 4. Ideal Industries, Inc.
  - 5. Panduit Corporation
  - 6. Presco
  - 7. Seton Identification Products
  - 8. Thomas and Betts Company
  - 9. Utility Safeguard

#### 2.2 GENERAL PRODUCT REQUIREMENTS

- A. Except where otherwise indicated, provide manufacturer's standard identification products of category and type suitable for each application. Where more than one identification method is specified for an application, the Installer shall select and utilize each material in a consistent manner.

#### 2.3 RACEWAY IDENTIFICATION

- A. Comply with ANSI A13.1 for minimum lettering size, length of color field, and coloring schemes for each raceway size, type, and location.
  - 1. Colors: Black letters on Orange field.

2. Legend: Raceways carrying the following:

- a. Power circuits less than 600V: Indicate system voltage.
  - b. Power circuits greater than 600V: Indicate warning. (Example – “DANGER – HIGH VOLTAGE”).
  - c. Low-voltage systems less than 50V: Indicate system type (Example – “TELECOMMUNICATIONS”).
- B. Adhesive labels: Preprinted, flexible, self-adhesive vinyl with legend overlaminated with a clear weather- and chemical-resistant coating.

2.4 CONDUCTOR AND CABLING IDENTIFICATION

- A. Adhesive labels: Preprinted, flexible, self-adhesive vinyl with legend overlaminated with a clear weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

2.5 EQUIPMENT IDENTIFICATION

- A. Engraved plastic nameplates: Laminated plastic, engraved, white letters on black background, except where other color schemes are noted or specified.
1. Size: Minimum 0.75-inch (19 mm) by 2.5-inches (64 mm).
  2. Letter size: Minimum height of 0.375-inch (10 mm).
  3. Mechanically fastened, except adhesive mounted where necessary due to substrate.
    - a. Mechanical fastener: Punched or drilled, with vandalproof stainless steel or brass screws or rivets.
- B. Baked-enamel signs: Preprinted, aluminum signs, punched or drilled for fasteners with corner grommets; with colors, legend, and size required for application.
- C. Exterior, metal-backed, signs: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate (CAB) signs with galvanized steel backing; punched or drilled for fasteners with corner grommets; with colors, legend, and size required for application.
- D. Adhesive film label: Machine-printed, black letters on white background, through thermal transfer or equivalent process, with clear weatherproof and UV-resistant covering. Minimum letter size height of 0.375-inch (10 mm).

2.6 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Wiring device tape labels:
1. Adhesive film label: Machine-printed, black letters on clear background, through thermal transfer or equivalent process. Minimum letter size height of 0.25-inch (6 mm).
    - a. Labeling for electrical devices and components such as receptacles, switches, control device stations, manual motor starters, network and phone jacks, junction and pull boxes, etc.
- B. Warning labels and signs:

1. Self-adhesive warning labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configures for display on front cover, door, or other access to equipment unless otherwise noted.
  2. Baked-enamel warning signs: Preprinted, aluminum signs, punched or drilled for fasteners with corner grommets; with colors, legend, and size required for application.
  3. Fasteners: Self-tapping, stainless-steel screws or, stainless-steel machine screws with nuts, flat and lock washers.
- C. Cable ties: Fungus-inert, self-extinguishing, one-piece, self-locking, color-coded, nylon cable ties suitable for the application (general purpose, UV-stabilized outdoor, or plenum rated).
- D. Paint: Formulated for the type of surface, location, and intended use.
- E. Stenciling: Nonfading, waterproof, ink or paint. Black or color-coded.
- F. Adhesive: Heavy-duty, thermo-resistant, industrial grade adhesive, for adhesion to any surface without identification curling, peeling, or falling off.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification products at locations for most convenient viewing without interference with operation and maintenance of equipment.
  1. For finished public spaces, coordinate identification product mounting locations with the COR.
- C. Existing Equipment: Apply identification products to unmarked existing equipment where work is being performed.
- D. Apply identification products to surfaces after equipment finish work has been completed.
- E. Clean surfaces before applying identification products, using materials and methods recommended by manufacturer of identification device.
- F. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- G. System identification labeling for raceways and cables: Each label shall be installed on sidewall of conduit and easily placed for proper identification. Locate labels at changes in direction, at penetrations of walls and floors, at 50-foot (15 m) maximum intervals in straight runs, and at 25-foot (7.6 m) maximum intervals in congested areas.

#### 3.2 APPLICATION

- A. Miscellaneous:
  1. Access doors and panels: Apply engraved nameplate labels at access doors identifying concealed electrical item. Do not locate labels in finished, public spaces.
- B. Junction and pull boxes:

1. Label each junction and pull box, identifying circuit designation or type of system.
    - a. Exposed boxes: Place label on coverplate, externally visible.
    - b. Concealed boxes: Place label or tag on inside cover of box.
    - c. Junction boxes concealed above suspended ceilings or exposed in non-occupied spaces may be marked with permanent ink marker in lieu of printed labels.
  2. Boxes with conductors greater than 600V: Apply labels identifying nominal system voltage on cover and minimum of one fixed side. One label shall be visible from the floor where boxes are installed exposed.
  3. Fire alarm system boxes shall have red finish. Boxes shall be prefinished prior to installation.
- C. Raceway identification: Apply identification products for each raceway.
1. Apply color-coded identification products to raceways as follows:
    - a. Normal power system: None.
    - b. Standby/emergency power system: None.
    - c. Fire alarm system: Red, solid colored.
    - d. Telecommunications system: None.
  2. Apply labels identifying nominal system voltage for the raceways containing feeders and raceways larger than 2-inch (53 mm) with power conductors.
  3. Apply system identification labels identifying type of system for low-voltage system raceways.
  4. Apply circuit designation markings on each feeder and branch circuit raceway entering and leaving each panelboard and switchboard. Mark raceway clearly with permanent ink marker or printed labels.
  5. Empty raceways: Apply labels indicating description of empty raceways (i.e., spare, future use) and identifying the beginning and end locations. Mark raceway clearly with permanent ink marker or printed labels.
  6. Abandoned raceways: Apply labeling indicating raceway has been abandoned.
- D. Wiring and cabling identification:
1. Power circuit conductor identification, 600 V or less: Apply color-coded identification for cables, feeders, and power circuit conductors exposed in accessible vaults, junction and pull boxes, utility structures, and equipment enclosures. Apply color-coding scheme as indicated below throughout the building's network of feeders and circuits, unless otherwise required by the authority having jurisdiction.
    - a. Colors on conductors No. 10 and smaller, or No. 6 and smaller for grounded and grounding conductors: Solid colored insulation.
    - b. Colors on conductors No. 8 and larger, or No. 4 and larger for grounded and grounding conductors: Apply colored tape wrapped a minimum of 6 inches (150 mm) on either end of conductor and in boxes where splices or taps are made.
    - c. Conductors used solely for grounding purposes shall be green, if insulated. Isolated ground conductors shall be green with a yellow strip.
    - d. Where multi-conductor cables are used, use same color coding system for identification of wiring.

COLOR CODE (600 V Max.)				
VOLTAGE	NEUTRAL	PHASE		
		A	B	C
120-V, 2-wire	White	Black, Red, or Blue depending on phase		



277-V, 2-wire	Gray	Brown, Orange, or Yellow depending on phase		
208/120-V wye, 3-phase, 4-wire	White	Black	Red	Blue
480/277-V wye, 3-phase, 4-wire	Gray	Brown	Orange	Yellow

2. Conductors for future use: Attach tags with circuit designation for conductors to be extended for future use.
  3. Control and low-voltage system wiring shall be coded with colors and markings different from those used to designate phase wires.
- E. Wiring device labels: For wiring devices such as receptacles, devices installed in surface raceway assemblies, and other wiring devices operating at or greater than 120V.
1. Apply adhesive film labels on inside of wiring device coverplates identifying circuit designation serving device.
  2. For special receptacle configurations, apply label identifying applicable device NEMA configuration designation in location not concealed by plug.
  3. Apply labels to devices serving low-voltage system devices including the following:
    - a. Fire alarm devices and test stations: Circuit designation.
    - b. Telecommunications device stations: Work area outlet designation.
    - c. Audio-visual device stations: Device designation.
- F. Equipment Identification: Install unique designation label consistent with contract documents and shop drawings.
1. Labeling instructions:
    - a. Engraved plastic laminate nameplates, unless otherwise indicated.
    - b. Unless otherwise required, provide a single line of text with 0.5-inch (13 mm) high lettering on 1.5-inch (38 mm) high label. Where two or more lines are required, use single label with increased height.
    - c. For multi-section or multi-compartment equipment, apply labels identifying each compartment or section.
    - d. For fusible equipment, identify fuse type and size on the front cover.
    - e. For enclosed circuit breaker equipment, identify device trip rating where rating is not visible.
    - f. Where equipment has more than one source of power (i.e., transfer switch, separate control power source), the location and circuit designation of each power source shall be clearly identified at the equipment location.
  2. Apply nameplates and labels to equipment according to the below identification schemes:
    - a. Identify equipment designation; voltage rating; phase and number of wires; and designation and location of load served. Apply products to the following equipment:
 

(1) Panelboards
  3. Nameplates shall incorporate white lettering on colored backgrounds based on the following color-coding scheme:
    - a. Normal Power System: Black background.
    - b. Emergency Power System (Life-Safety Branch): Red background.

G. Warning and caution labels and signs:

1. Apply warning and caution labels on equipment in accordance with NFPA 70 and 70E, ANSI, and OSHA requirements including arc-flash hazard warning labels and special clearance requirements.
2. Apply warning and caution labels and signs at locations where safe operation and maintenance of electrical system equipment is of concern.
3. Apply warning signs on electrical room doors in accordance with NFPA 70 and 70E, ANSI, and OSHA requirements. Where doors are located in finished, public areas, located sign on the inside of the door. Coordinate mounting requirements with door type.

### 3.3 FIELD QUALITY CONTROL

- A. Coordinate names, abbreviations, colors, and other designations with construction documents, submittals, and applicable code and standards requirements. Utilize consistent designations and identification techniques throughout project.
- B. Install identification products at locations that are clearly visible at normal viewing angles and without interference with operation and maintenance of the equipment.
- C. Install identification products in a neat and clean, workmanship-like manner where products are securely attached and oriented parallel to equipment edges.

END OF SECTION 26 0553

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## SECTION 26 0923 - LIGHTING CONTROL DEVICES

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Switches.
- B. Occupancy sensors.

#### 1.2 RELATED SECTIONS

- A. Identification: Section 26 0553.

#### 1.3 SUBMITTALS

- A. Product data: Each type of device used in the project.
- B. Field quality control test reports.
- C. Qualifications of testing agency.

#### 1.4 QUALITY ASSURANCE

- A. All devices shall be UL listed for their intended application.
- B. Provide services from a third party testing agency to perform functional testing.
- C. Testing agency qualifications: An independent agency, not directly involved in either the design or construction of the project, with the experience and capability to conduct the testing indicated.

### PART 2 - PRODUCTS

#### 2.1 SWITCHES

- A. Manufacturers:
  - 1. Pass and Seymour, Inc. (Basis of Design).
  - 2. Leviton Manufacturing Co.
  - 3. Hubbell/Bryant Electric.
  - 4. Or approved equal.
- B. Provide devices conforming to UL 20, equal to the following Pass & Seymour catalog numbers:
  - 1. Switches: PS20AC1, PS20AC3 (3-way), PS20AC4 (4-way).
  - 2. Switches, key-operated: PS20AC1-L, PS20AC3-L (3-way), PS20AC4-L (4-way).
  - 3. Switch with pilot light (illuminated clear toggle when in OFF position): PS20AC1-CSL.
  - 4. Switches, weatherproof: PS20AC1, PS20AC3 (3-way), PS20AC4 (4-way), with CA1-GL cover.
- C. Device color: White.

- D. Device plates: Equal to Pass & Seymour: Smooth nylon, TP Series, color shall match device color.

## 2.2 OCCUPANCY SENSORS

### A. Available manufacturers

1. Hubbell Inc.
2. Leviton
3. Lutron
4. Novitas/Cooper Controls
5. Sensor Switch
6. Watt Stopper/Legrand
7. Or approved equal.

### B. Sensor types:

1. Wall switch sensor: Dual technology, combination ultrasonic/passive infrared detector with override switch, capable of installation in a standard wall switch backbox.
  - a. Line voltage: Rated at 120/277 dual-input voltage, 60 Hz.
2. Dual relay wall switch sensor: Dual technology, combination ultrasonic/passive infrared detector with two override switches; each capable of accepting up to 800 watts of load at 120 volts, or 1200 watts of load at 277 volts. Detector shall be capable of being installed in a standard wall switch backbox.
  - a. Line voltage: Rated at 120/277 dual-input voltage, 60 Hz.
3. Ceiling sensor: Dual technology, combination ultrasonic/passive infrared detector capable of installation in acoustic ceiling tile or gypsum ceiling. Detector shall provide 360 degree coverage.
  - a. Low voltage: Rated at 24 input voltage, 60 Hz, with power pack and low-voltage wiring per manufacturer's requirements.

### C. Auxiliary components:

1. Power pack: Universal 120/277V switched input, controlled through a high-current 20A relay. Low voltage output, less than or equal to 24VDC, for powering low voltage occupancy sensors. Enclosure shall be plenum rated.
2. Override switch: Low voltage switch shall operate on voltage less than or equal to 24VDC and shall have a momentary contact actuator to send a signal to the associated power pack to change the current lighting state. Color shall match switch device color specified above.

- D. Ultrasonic detector: Volumetric sound wave at 40 kHz frequency. Detector shall automatically adjust detection threshold to compensate for learned environmental behavior.

- E. Infrared detector: Passive, with field-adjustable ambient light adjustment.

- F. Indicator: LED positive detection.

- G. Adjustable delayed off-time range: Between 30 seconds and 15 minutes, factory set to 15 minutes.

- H. Fail on: Lights will stay on if sensor fails.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION, GENERAL

- A. Install devices in complete compliance with the manufacturer's recommendations.
- B. Provide a single cover plate where two or more devices are grouped together in one box.
- C. Verify door swings with door frame installed prior to rough-in for switches.
- D. Fully document all control device calibration settings after system programming with manufacturer's representative and submit this information as a part of the O&M manual.
- E. Devices shall be installed and programmed to meet the control intent as outlined in the construction documents.

#### 3.2 INSTALLING OCCUPANCY SENSORS

- A. Install in accordance with manufacturer's written instructions.
- B. Provide line voltage type detectors when a single device, wall or ceiling, controls lighting within a single space.
- C. Provide low voltage type detectors when multiple detectors, wall or ceiling, are wired together for control over a single space.
- D. Coverage pattern: Verify coverage pattern of single detector or system of detectors to be capable of complete coverage of the space in which the lighting is intended to be controlled. Provide additional detectors as necessary to satisfy complete coverage.
- E. Programming requirements:
  - 1. Vacancy mode (Manual On, Automatic Off) set for the following spaces:
    - a. Offices
    - b. Break Rooms
    - c. Conference/Multipurpose

- 2. Occupancy mode (Automatic On, Automatic Off) set for the following spaces:

- a. Corridors/Lobbies

#### 3.3 FIELD QUALITY CONTROL

- A. Functional testing. Perform tests and prepare test reports for the following:
  - 1. Control systems shall be tested to ensure that control hardware and software are calibrated, adjusted, programmed, and in proper working condition in accordance with the contract documents and manufacturer's installation instructions.

2. For occupancy sensors, confirm that the placement, sensitivity, and time-out settings are optimized to ensure lights turn off only after each space is vacated and do not turn on unless the space is occupied.

END OF SECTION 26 0923

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## SECTION 26 2726 - WIRING DEVICES

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Receptacles.

#### 1.2 RELATED SECTIONS

- A. Nameplates: Section 26 0553.

#### 1.3 SUBMITTALS

- A. Product data: Each type of device used in the project.

### PART 2 - PRODUCTS

#### 2.1 RECEPTACLES

- A. Available manufacturers:

1. Pass & Seymour, Inc.
2. Leviton Manufacturing Co.
3. Hubbell/Bryant Electric
4. Or approved equal.

- B. Provide devices conforming to UL 498 for receptacles, equal to the following Pass & Seymour catalog numbers or NEMA WD 1 and WD 6 configuration numbers:

1. Duplex convenience receptacles: PS8300H, NEMA 5-20R, brass mounting strap.
  - a. Isolated ground: IG8300, NEMA 5-20R.
2. GFCI receptacles: 2097HG, NEMA 5-20R.
  - a. Exterior and wet locations: 2097TRWR, 20 amps, weather-resistant, tamper-resistant.
  - b. Interior cover: WP26 vertical, WPH26 horizontal.

- C. In demountable partitions, provide the following Pass & Seymour devices if above devices do not fit.

1. 20 amp receptacles: Two 1333 with mtg. straps and SNK-2-4N plate with insulating adapter.

- D. Device color:

1. General-purpose receptacles: White.
2. Emergency power receptacles: Red.
3. Isolated ground receptacle: Orange.

- E. Device plates: Equal to P&S: Smooth nylon, TP Series, color shall match device color.

## 2.2 FLOOR BOXES

- A. Poke-through service fitting for power and communications: As specified in Section 26 0534, Boxes, complete with 20 A, 125 V receptacles as indicated on the drawings.

## 2.3 WALL BOXES

- A. Wall box service fitting for power and communications: As specified in Section 26 0534, Boxes complete with 20 A, 125 V receptacles as indicated on the drawings.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install devices in complete compliance with the manufacturer's recommendations.
- B. Receptacles orientation:
  - 1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.
- C. Device plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
- D. Arrangement of devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent devices under single multi-gang wall plates.

### 3.2 IDENTIFICATION

- A. Comply with Section 26 0553 "Identification for Electrical Systems."
- B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.
- C. Attach nameplates securely to receptacle cover plates. Provide nameplates for all devices except 120-volt receptacles, identifying equipment and use.

END OF SECTION 26 2726

## SECTION 26 5100 - INTERIOR LIGHTING

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Lighting fixtures, including lamps, drivers, and accessories.
- B. Emergency lighting control transfer relay device.

#### 1.2 RELATED SECTIONS

- A. Occupancy sensors: Section 26 0923.

#### 1.3 SUBMITTALS

- A. Product data: For each type of lighting fixture indicated, arranged in order of fixture designation. Include data on features, accessories, and the following:
  - 1. Dimensions of fixtures, photometrics and efficiency, wattage, reflectors, glassware, voltage, suspension, and appurtenances.
  - 2. Certified results of laboratory tests for fixtures and lamps for photometric performance.
  - 3. LED drivers
  - 4. Lumen output, rated color temperature, and manufacturer's LED binning procedures.
  - 5. Types of lamps.
- B. Samples: If contractor has selected fixtures not identical to scheduled fixtures, as permitted in Part 2 below as an option, COR may require submittal of samples.
  - 1. One complete fixture of each approved type, except as otherwise instructed by the COR.
  - 2. Install approved samples as work of the project, in locations as directed, as standards for all fixtures of the same type.
  - 3. Ascertain that the fixture will fit in the available space and is coordinated with adjacent and connected products.
- C. Maintenance data: For lighting fixtures to include in maintenance manuals specified in Division 01.

#### 1.4 QUALITY ASSURANCE

- A. UL label and local testing (if required): As specified in Section 26 0500, Common Work Results for Electrical.
- B. Comply with requirements for commissioning specified in Division 01.
- C. Fixtures, emergency lighting units, and accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
- D. Comply with NFPA 70.
- E. NFPA 101 Compliance: Comply with visibility and luminance requirements for exit signs.

## 1.5 COORDINATION

- A. Fixtures, mounting hardware, and trim: Coordinate layout and installation of lighting fixtures with ceiling system and other construction.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver glassware and lamps in their original cartons, clearly labeled.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Basis-of-design products: Fixtures indicated in the Fixture Schedule on the drawings are the basis of design of the project.
  - 1. Subject to compliance with requirements, provide the scheduled products. Unnamed products will only be considered and approved according to Bidding and Contracting requirements and Division 01 requirements for substitutions.
- B. Subject to compliance with requirements, provide products by one of the following:
  - 1. Drivers:
    - a. Philips/Advance
    - b. Osram Sylvania
    - c. Universal Lighting Technologies
    - d. Lutron
    - e. EldoLED
    - f. Or approved equal.

### 2.2 FIXTURES, GENERAL

- A. Fixtures shall comply with UL 1598 and be complete with sockets, casings, fittings, holders, shades, glassware, lamps, and appurtenances, wired and completely assembled.
- B. Metal parts: Free from burrs, sharp corners, and edges.
- C. Sheet metal components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.
- D. Doors, frames, and other internal access: Smoothly operating, free from light leakage under operating conditions, and arranged to permit relamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during relamping and when secured in operating position.
- E. Metal finishes: Painted after fixture fabrication.
- F. Reflecting surfaces: Minimum reflectance as follows, unless otherwise indicated:
  - 1. White surfaces: 85 percent.
  - 2. Specular surfaces: 83 percent.
  - 3. Diffusing specular surfaces: 75 percent.
  - 4. Laminated silver metalized film: 90 percent.

G. Lenses, diffusers, covers, and globes: 100 percent virgin acrylic plastic or annealed crystal glass, unless otherwise indicated, exactly as scheduled or specified in optical details and lighting characteristics.

1. Plastic: High resistance to yellowing and other changes due to aging, exposure to heat, and ultraviolet radiation.
2. Lens thickness: 0.125 inch (3 mm) minimum, unless greater thickness is indicated.

## 2.3 LED DRIVERS

- A. Driver shall operate from a 120-volt or 277-volt, 60-Hz input power source and be suitable for outputting power to 12-volt or 24-volt LED lamp sources, as required.
- B. Drivers, where specified, shall be capable of being dimmed. Dimmable drivers shall be controlled by a Class 2 low-voltage 0-10VDC controller.
- C. Performance Criteria:
1. Driver shall have a Class A sound rating.
  2. Driver shall have a power factor (PF) greater than 0.90.
  3. Driver shall have Total Harmonic Distortion (THD) of input current equal to or less than 20 percent.
- D. Driver shall meet FCC and Title 47 CFR regulations for EMI/RFI.
- E. Driver shall comply with ANSI C62.41 Class A requirements for transient protection.

## 2.4 EXIT SIGNS

- A. General requirements: Exit signs shall meet the Energy Star Program requirements to operate on 5 W or less input power per face. Comply with UL 924 and the following:
1. Sign colors and lettering size: Comply with authorities having jurisdiction.
- B. Internally lighted signs: As follows:
1. Lamps for ac operation: Light-emitting diodes, 70,000 hours minimum rated lamp life.

## 2.5 EMERGENCY LIGHTING CONTROL TRANSFER RELAY DEVICE

- A. Internal type (single fixture): Self-contained, modular unit mounted within fixture body. UL 924 listed as “emergency lighting equipment” and UL listed for field installation.
1. Capable of bypassing the local switching means when normal utility power has been lost.
  2. Device shall consist of a test switch, normal power indicator light and an alternate power indicator light.
  3. Rated for 120 through 277-volts AC, up to 3 amperes of lighting load.
  4. Emergency lighting control relay control device: Equal to Bodine, Model GTD.

## 2.6 LAMPS

- A. Lamps, LED:

1. The LED manufacturer shall provide the quantity and wattage of LEDs required to achieve the defined lighting output set forth by the lighting fixture manufacturer.
2. LED lamps shall be integrated into an engineered package for the specific lighting fixture application, including heat dissipation components.
3. Color temperature: As specified in lighting fixture schedule, with a tolerance of plus or minus 100K and within a range of three macadam ellipses. Noticeable color temperature variation between adjacent lighting fixtures shall be considered a failure to meet these specifications and shall be replaced at no cost to the Government.
4. Minimum performance characteristics:
  - a. Life: Minimum lumen maintenance of L70 at 50,000 hours, as defined by IES LM-80.
  - b. Lumen Output: Based on absolute photometry, lumens (total luminous flux exiting the physical luminaire), as specified on contract drawings and schedules.
  - c. Color Rendering Index: Rated at 85 or higher.

## 2.7 FIXTURE SUPPORT COMPONENTS

- A. Comply with Section 26 0500, Common Work Results for Electrical, for channel- and angle-iron supports and nonmetallic channel and angle supports.
- B. Single-stem hangers: 1/2-inch (12-mm) steel tubing with swivel ball fitting and ceiling canopy. Finish same as fixture.
- C. Twin-stem hangers: Two, 1/2-inch (12-mm) steel tubes with single canopy arranged to mount a single fixture. Finish same as fixture.
- D. Rod hangers: 3/16-inch- (5-mm-) minimum diameter, cadmium-plated, threaded steel rod.
- E. Hook hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.
- F. Aircraft cable support: Use cable, anchorages, and intermediate supports recommended by fixture manufacturer.

## 2.8 FINISHES

- A. Fixtures: Manufacturer's standard, unless otherwise indicated.
  1. Paint finish: Applied after fabrication over corrosion-resistant treatment or primer, free of defects.
  2. Metallic finish: Corrosion-resistant.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Before ordering the light fixtures, consult with the installer of the ceilings to ensure that the correct fixture trim is supplied and installed. Provide the supports and accessories required for installation in each ceiling system.
- B. Before ordering the light fixtures, verify the specified voltage with the voltage shown on the drawings to ensure the correct voltage is supplied.

### 3.2 INSTALLATION

- A. Furnish and install a complete lighting fixture for every outlet indicated on the drawings so that every outlet shall be properly provided with a suitable fixture of type specified, of wattage indicated.
- B. Fixture wire shall bear UL label. Fixture wiring for fixtures and branch circuit wiring in fixture channels shall be type THHN.
- C. Each fixture shall be completely equipped with lamps of the size, type, wattage and shape indicated and specified. Lamps shall be of the proper voltage for the building.
- D. Furnish fixtures in the quantities, sizes, and types indicated on drawings.
- E. Where a letter designating fixture type is adjacent to a row of fixtures, it shall be understood that all fixtures in the row shall be of this type, consisting of either four-foot or eight-foot units, the rows consisting of the total lengths indicated. Where the catalog numbers of the fixtures refer to 4-foot units, 8-foot units may be used where applicable.
- F. Provide recessed fixtures with flexible conduit connector and wire (fixture whip), or a removable wiring access plate, so that they may be wired without removing ballast cover. Plate shall be screwed to fixture housing and conduit shall be securely attached and grounded to fixture to meet NEC requirements.

### 3.3 FIXTURE SUPPORT

- A. Support from building structure: Provide fasteners appropriate to the supporting substrate, and wire, jack chain, or rods as specified for particular fixture types below.
  - 1. Provide channels bolted or welded between joists where required to obtain proper spacing for lighting supports.
  - 2. Connections to joists or beams: Beam clamps. For wire supports, wrap wire securely around structural member.
  - 3. Connections to concrete: Embedded, as specified in Section 26 0533, Conduits.
- B. In suspended plaster and drywall ceilings, fixtures may be supported from the suspended ceiling construction. Fasten box and fixture supports securely to suspension system. Where fixtures are surface-mounted, cut neat holes in the plaster as required for supports.
- C. Recessed fixtures in suspended acoustical ceilings: Coordinate fixture installation with ceiling installer. Ensure that ceiling supports are located to clear fixtures.
  - 1. Support from building structure: Use fasteners specified in Section 26 0533, Conduits, and No. 10 wire.
    - a. Provide 2 supports for each individual fixture, one at each end of fixture. In continuous rows, install additional supports at each joint.
- D. Surface-mounted and stem-suspended fixtures on or below suspended acoustical ceilings: Supported from the building structure above with No. 10 wire.
  - 1. Provide two supports for each individual fixture, one at each end of fixture. In continuous rows, install an additional support at each joint.

2. Surface-mounted fixtures mounted on low-density ceilings shall be provided with spacers where required.

E. Where it is necessary for a fixture to be installed directly below an air duct, install two hanger rods, one on each side of the duct, bolted to a channel or angle suspended from the hangers under the duct, and support the fixtures from the suspended channel or angle.

### 3.4 ADJUSTMENT PERIOD

A. Occupancy adjustments: When requested within 3 months of date of Substantial Completion, provide on-site assistance in adjusting fixtures to suit occupied conditions. Provide up to 2 visits to project outside of normal occupancy hours for this purpose. Some work may be required after dark.

### 3.5 CLEANING

A. Light fixtures, used for temporary lighting during construction, shall be cleaned free of construction dirt to like-new condition, and re-lamped with the specified lamps.

END OF SECTION 26 5100



## SECTION 27 0101 - COMMUNICATIONS GENERAL PROVISIONS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. General provisions and requirements for communications work.

#### 1.2 RELATED SECTIONS

- A. Requirements of this section generally supplement requirements of Division 01.

#### 1.3 REFERENCES

- A. NFPA 10: Portable Fire Extinguishers.
- B. NFPA 241: Safeguarding Construction, Alteration, and Demolition Operations.

#### 1.4 SYSTEM DESCRIPTION

- A. The full set of Contract Documents applies to work of Division 27.
- B. Visit the site and study all aspects of the project and working conditions, as required by General and Supplementary Conditions, Bidding and Contracting Requirements, Drawings, and Specifications. Verify field dimensions.
- C. The work covered in technical sections includes the furnishing of all labor, equipment and materials, and the performance of all operations pertinent to the work described.
- D. Except as required otherwise in Division 01, promptly obtain and pay for, all necessary signatures and paperwork, all permits, fees and inspections required for work of this division by authorities having jurisdiction, including any utility connection or extension charge. No payment will be made until a copy of the permit is forwarded to the Government.
- E. Communications work of this project includes, as a brief general description, the following:
  - 1. Provide telecom/data drops from Government equipment to new locations.
- F. See Division 01 for requirements related to Government's occupancy of the premises, limits on use of site, time restrictions on work, limits on utility outages or shutdowns, and phasing (sequencing) and scheduling.

#### 1.5 PRODUCT OPTIONS

- A. Except as modified by provisions of Bidding and Contracting Requirements and Division 01, these options apply to Division 27 specifications.
- B. General: Where Contractor is permitted to use a product other than the specified item and model named as the basis of design, Contractor is responsible for all coordination and additional costs as specified in article "Substitutions" below for substitutions.
- C. Products specified by reference standards or by description only: Any product meeting those standards or description.

- D. Products specified by naming one or more manufacturers, or model name or catalog reference number: Products specified establish a standard of quality, options to be included, and performance, and shall not be construed as limiting competition. Contractor may use products of any manufacturer, which meet the specification.
- E. Products specified by naming one manufacturer and particular product, with no provision for other options: No options or substitutions allowed.

#### 1.6 SUBSTITUTIONS

- A. Substitutions will be considered only as permitted or required by the Bidding and Contracting Requirements and Division 01. Except as modified by those requirements, the requirements below apply to Division 27 specifications.
- B. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.
- C. Document each request with complete data substantiating compliance of proposed substitution with contract documents.
- D. A request constitutes a representation that the Bidder or Contractor:
  - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
  - 2. Will provide the same warranty for the substitution as for the specified product.
  - 3. Will coordinate installation and make changes to other work which may be required for the work to be complete with no additional cost to the Government.
  - 4. Waives claims for additional costs or time extension which may subsequently become apparent.
  - 5. Will reimburse the Government for review or redesign services associated with re-approval by authorities.
- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitution submittal procedure is specified in Bidding and Contracting Requirements and Division 01.

#### 1.7 MATERIALS AND EQUIPMENT

- A. All materials and equipment shall be new and the best of their respective kinds, suitable for the conditions and duties imposed on them by the project and of representative manufacturer. The description, characteristics and requirements of the materials to be used shall be in accordance with the specifications.
- B. All equipment, construction and installation must meet requirements of local, state and federal governing codes.
- C. Singular number: In cases where material, a device, or part of the equipment is referred to in the singular number in the specifications, it is intended that such reference shall apply to as many items of material, devices, or parts of the equipment as are required to complete the installation as shown on the drawings or required for proper operation of the system.

D. Terms have the following meanings:

1. Furnish: Supply item
2. Install: Mount and connect item
3. Provide: Furnish and install

E. All materials and equipment shall be installed and completed in a first class and workmanlike manner and in accordance with the best modern methods, practice and manufacturers' instructions. Any work which shall not present an orderly and neat or workmanlike appearance shall be removed and replaced with satisfactory work when so directed in writing by the COR.

F. The specifications and drawings are intended to define the minimum requirements, as to quality of materials, construction, finish and overall workmanship.

G. General Conditions describe the correlation and intent of the Contract Documents. In case of discrepancies between the specifications and drawings, the specifications should be followed as to the general methods and principles and the drawings followed as to sizes, capacities and specifics for corresponding parts. If sizes are omitted, the COR will determine sizes to be utilized.

H. In all cases of doubt, uncertainty, or conflict as to the true meaning of the specifications or drawings, it is the responsibility of the Contractor to notify the COR of said uncertainty, doubt, or conflict and obtain a decision as to the intent prior to initiating any work which may be affected by this decision.

## 1.8 COORDINATION

A. Should a situation develop during construction to prevent the proper installation of any equipment or item where shown on the drawings, call the situation to the attention of the COR and await a written decision.

B. Plan and coordinate all work to proceed in an orderly and continuous manner without undue delay, and in conformance with the project schedule. Submit samples, shop drawings, schedules, insurance policies and certificates, and the like in time to avoid delays in actual construction. Coordinate communications work so that work of each trade is completed before other construction begins which would obstruct it.

C. Coordinate trades to ensure that proper clearances between work of the various trades allow access to items which require operation and maintenance.

D. Coordinate location and elevation of all conduit, light fixtures, equipment, and appurtenances in such a manner that the finished installation is as indicated on drawings. In the event difficulties are encountered which prevent this, it is the Contractor's responsibility to bring this to the attention of the COR prior to initiation of work. Correct improperly coordinated installation at no additional cost.

E. The Contractors' assistants shall include a competent communications foreman, who shall be on the premises at all times to check, layout, coordinate and superintend the installation of work. The foreman shall establish all basic requirements relative to the work before starting, and be responsible for the accuracy thereof.

## 1.9 SUBMITTALS

A. Manufacturers' and subcontractors' lists:

1. As specified in Division 01, submit a complete list of proposed manufacturers for all equipment, materials and subcontractors used for the work of this division. Lists shall follow the sequence of the specifications. No considerations will be given for partial or incomplete lists. After review of lists, submit shop drawings and product data.
- B. Shop drawings and product data:
1. Submit in accordance with the requirements of Division 01 or as established at the preconstruction conference, the required number of copies of Shop Drawings and Product Data for every item of equipment. Shop drawings or product data will not be considered until Manufacturers' Lists have been approved. Shop drawings and product data shall be submitted, as required by the General Conditions, with sufficient time for checking, return to Contractor, and resubmission as required before Contractor shall install any item.
  2. Each item submitted shall be properly labeled, indicating the specific service for which the equipment or material is to be used, section and paragraph number of specification or drawing number to which it applies, Contractor's name and project name and number. Data submitted shall be specific and shall include product data and printed information in sufficient detail and scope to verify compliance with requirements of the contract documents. Clearly identify each item within the data. Data of a general nature will not be accepted. Each sheet must clearly show the project name and number.
  3. The review of a shop drawing or product data shall not be considered as a guarantee of the measurements or building conditions or that the shop drawings or product data have been checked to see that item submitted properly fits the building conditions. This review shall not relieve the Contractor of the responsibility for furnishing material or performing work as required by the contract documents, for correctness of dimensions and quantities, or for proper coordination of details and interfaces among trades.
  4. All exclusively communications items furnished as items associated with mechanical items but not specifically described in the mechanical item submission, shall be submitted as a separate submittal but shall be clearly marked as associated with the mechanical item by identified specification paragraph.
  5. Product data sheets shall be 8.5-inches by 11-inches cut sheets for operating and maintenance manual.
- C. Submit at least three copies of the results of every test required under any section in this division.
- D. Specialist shall submit a list of at least three projects similar to this project in type, size, and quality, which have been in place and operating satisfactorily for at least five years.
1. Include project name, address, name and phone number of Government's representative, and project type and size.
- E. After the work is completed, submit all required certificates of approval from approved inspection agencies and authorities having jurisdiction over work of this division. Certificates of approval must be received by the COR prior to final acceptance of the work.
- 1.10 SPECIALIST
- A. The term "Specialist" as used in the specification shall mean an individual or firm of established reputation (or, if newly organized, whose personnel have previously established a reputation in the same field,) which is regularly engaged in, and which maintains a regular force of workers skilled in either (as applicable) manufacturing or fabricating items required by the contract, installing items required by the contract, or otherwise performing work required by the contract. Where the specification requires installation by a specialist, the term shall also be deemed to mean the

manufacturer of the item, an individual or firm licensed by the manufacturer, or an individual or firm who will perform the work under the manufacturer's direct supervision.

#### 1.11 CONTRACT CLOSEOUT SUBMITTALS

##### A. Project record documents:

1. Maintain on site one set of the following record documents; record actual revisions to the work of this division:
  - a. Contract Drawings.
  - b. Specifications.
  - c. Addenda.
  - d. Change Orders and other Modifications to the Contract.
  - e. Reviewed shop drawings, product data, and samples.
2. Maintain record documents separate from documents used for construction.
3. Record information concurrent with construction progress.
4. Specifications: Legibly mark and record in each section a description of actual products installed, including the following:
  - a. Manufacturer's name and product model and number.
  - b. Product options, substitutions, or alternates utilized.
  - c. Changes made by addenda and modifications.
5. Record documents and shop drawings: Legibly mark each item to record actual construction, including:
  - a. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the work.
  - b. Field changes of dimension and detail.
  - c. Details not on original Contract Drawings.
6. Submit documents as specified in Division 01.

##### B. Operation and maintenance data:

1. Submit sets prior to final inspection as specified in Division 01. Unless otherwise specified in Division 01, submit no fewer than three sets. In addition to requirements specified in Division 01, submit operating and maintenance manuals for the work of this division as specified below.
2. Binders: Provide large enough binders, and sufficient quantity, that the required contents can be easily turned, removed, and reinserted.
  - a. Self-expanding fast lock type.
  - b. Three telescoping metal posts.
  - c. Durable plastic covers.
  - d. Angle spline with guide flanges.
  - e. Text page size - 8.5 by 11 inches.
  - f. Boorum and Pease, Stock No. C-619-3 expansion 3 inch to 5 inch or Stock No. C-1219 expansion 1.5 inch to 2.5 inch, or equal by National or Wilson Jones.

3. Prepare binder covers with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS," and title of project. Print on spine of binder "O & M INSTRUCTIONS." If more than one binder is required, print covers and spines with volume numbers. Include in the front of every binder an index to all binders.
4. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
5. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, typed on white paper.
6. Part 1: Directory, listing names, addresses, and telephone numbers of communications engineers; contractor; communications subcontractors; and major communications equipment suppliers.
7. Part 2: Operation and maintenance instructions, arranged by specification section. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify the following:
  - a. Significant design criteria.
  - b. List of equipment.
  - c. Parts list for each component, including recommended spare parts list.
  - d. Operating instructions.
  - e. Maintenance instructions for equipment and systems.
  - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.
8. Part 3: Project documents and certificates, including the following:
  - a. Shop drawings and product data.
  - b. Photocopies of certificates.
  - c. Photocopies of warranties, guarantees, and bonds.
  - d. Test reports: Copies of the results of all tests required under all sections of specifications.
9. Submit one copy of completed volumes in final form 15 days prior to final inspection. This copy will be returned after final inspection, with Engineer comments. Revise content of documents as required prior to final submittal.
10. Submit final volumes revised, within ten days after final inspection.

#### 1.12 REGULATORY REQUIREMENTS

- A. When these specifications call for materials or construction of a better quality or larger sizes than required by the following codes and standards, the provisions of the specifications shall take precedence.
- B. Provide, without extra charge, any additional materials and labor which may be required for compliance with these codes and standards even though the work is not mentioned in these specifications or shown on the contract drawings.
- C. Perform the work of this division in strict accordance with the following authorities. The latest revision of these codes accepted by the authority having jurisdiction as of the date of the contract documents shall apply.
  1. The communications, building, fire, and safety codes of the state and county or city in which the work is being performed.
  2. The National Electric Code, NFPA 70 (NEC).
  3. The National Fire Protection Association Code. (NFPA)
  4. International Building Code (IBC).

5. International Energy Conservation, Fire, and Communications Codes (ICC).

#### 1.13 REFERENCE STANDARDS

- A. Perform the work of this division using the standards of the following organizations, as referred to in technical sections, as a minimum requirement for construction and testing. Unless specified otherwise in Bidding and Contract Documents or Division 01, the latest revision current as of the date of the contract documents shall apply.
  1. Factory Mutual (FM)
  2. Federal Specifications (FS)
  3. Military Standards (Mil. Std.)
  4. American National Standards Institute (ANSI)
  5. American Society for Testing and Materials (ASTM)
  6. International Code Council (ICC)
  7. Institute of Communications and Electronics Engineers (IEEE)
  8. National Communications Code (NEC) (NFPA 70)
  9. National Communications Manufacturer's Association (NEMA)
  10. National Fire Protection Association (NFPA)
  11. The Occupational Safety and Health Act (OSHA)
  12. Underwriters Laboratory Inc. (UL)
  13. American Association of State Highway and Transportation Officials (AASHTO)
  14. American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)
  15. Maryland Occupational Safety and Health Act (MOSHA)
  16. Illuminating Engineering Society of North America (IESNA)

#### 1.14 TEMPORARY STORAGE

- A. Maintain upon premises, where directed, a storage area, and be responsible for all contents within these areas. Provide all security measures necessary for this area.
- B. Area shall be maintained and shall be returned to original condition at the completion of the project.
- C. Store communications construction materials such as wire, raceways and boxes, devices, and equipment in buildings, enclosed trailers, or portable enclosed warehouses.
  1. Materials and products subject to damage from moisture: Store in dry locations. If necessary, protect with protective wraps or covers.
  2. Plastics and other materials and products subject to damage from heat or cold: Store at manufacturer's recommended temperatures.
  3. Plastics and other materials and products subject to damage from sunlight: Protect from sunlight.
- D. Communications equipment such as motor controllers, panelboards and circuit breakers stored before installation and installed during construction: Provide clean, dry locations at manufacturer's recommended temperatures, and cover or wrap if required to protect from incidental damage.

#### 1.15 PROTECTION

- A. Control dust resulting from construction work to prevent its spread beyond the immediate work area, and to avoid creation of a nuisance.
  1. Do not use water to control dust. Use drop cloths or other suitable barriers.

2. In areas where dirt or dust is produced as a result of the work, sweep daily, or more often as required.
  3. Provide walk-off mats at entries and replace them at regular intervals.
  4. Construct dust partitions, where indicated on the drawings or as required.
  5. Protect areas occupied by Government personnel or equipment.
  6. Seal off all return air registers and other mechanical systems to prevent dust from entering.
- B. Each trade and subcontractor is responsible for preventing damage and soiling of work performed by other trades or subcontractors. Each trade and subcontractor is responsible for providing temporary protection of its own work.
1. Protect work from spills, splatters, drippings, adhesives, bitumens, mortars, paints, plasters, and damage from welding or burning.
  2. Protect finished work from damage, defacement, staining, or scratching.
  3. Protect finishes from cleaning agents, or grinding and finishing equipment.
  4. Protect adjacent and finished work from damage, using tape, masking, covers or coatings and protective enclosures.
  5. Coordinate installations and temporarily remove items to avoid damage from finishing work.
- C. Repair all damage or soiling to the complete satisfaction of the COR; replace any materials or work damaged to such an extent that they cannot be restored to their original condition, all at no addition to the Contract sum.
- D. Protect work stored in place and supplies stored in the building.
1. Store materials and products, subject to damage from moisture, in dry locations. If necessary, protect in wraps or covers.
  2. Store plastics, other materials, and products subject to damage from heat or cold at manufacturer's recommended temperatures.
- E. Protect communications materials and products from weather events and accidents of construction.
- F. Use of sidewalk or roadway areas outside of the property lines shall be with permission and approval of the local authorities having jurisdiction.

#### 1.16 FIRE PROTECTION

- A. As a minimum, provide hand-carried, portable, UL-rated extinguishers with each work crew working inside the building.
- B. Select extinguishers in accordance with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

#### 1.17 PROJECT CONDITIONS

- A. Drawings showing utilities in concealed locations are based on the best information available but are not represented as being precisely correct. Work of the contract includes digging, cutting, drilling, using nondestructive methods, and other methods of locating concealed utilities in the field, as well as patching and repairing as specified in "Cutting and Patching" below.
- B. If, in the course of the work, workers encounter a material they suspect to present some hazard:
  1. Promptly notify the COR in writing.



2. Do not perform any work which would disturb the suspected material until written instructions have been received.

#### 1.18 WARRANTY

- A. All work and equipment provided as work of this division shall be fully warranted under the general project warranty. In addition, provide added special warranties as specified in individual sections.
- B. During the correction period, the Contractor shall promptly correct any work found to be defective or otherwise not in accordance with the requirements of the Contract Documents, on receipt of written notice from the COR. Except as otherwise required in General Conditions and Division 01, the correction period is one year after the date of substantial completion of the work. Work requiring correction shall promptly be repaired or completely replaced at no addition to the Contract Sum.
- C. When use of the permanent equipment has been permitted for temporary services during construction of the building, the warranty and correction periods shall nevertheless begin at the time of substantial completion, unless another date of acceptance has been agreed to by the Government.
- D. Special warranties are warranties required by individual specification sections, incidental product warranties, manufacturers' standard warranties, installer or subcontractor service agreements, and other individual warranties in addition to the general project warranty.
- E. Provide copies of warranties as required for Operation and Maintenance Manual specified above, and by Division 01.
- F. For items of work delayed beyond date of substantial completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

#### PART 2 - PRODUCTS

Not used.

#### PART 3 - EXECUTION

##### 3.1 CUTTING AND PATCHING

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
- B. Cut walls, floors, partitions, roofs, and other appurtenances for the passage or accommodation of conduits. Close superfluous openings and remove all debris caused by work of this division.
- C. No cutting of any structure or finish shall be done until the condition requiring such cutting has been examined and approved by the COR.
- D. New or existing surfaces disturbed as a result of such cutting or otherwise damaged shall be restored to match original work and all materials used for any patching or mending shall conform to the class of materials originally installed.
- E. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

3.2 TEMPORARY FACILITIES

- A. Temporary water facilities, electricity, telephone, toilet facilities, and temporary heat, shall be provided as specified in Division 01.

3.3 PROGRESS MEETINGS

- A. Progress meetings shall be held as specified in Division 01, and also when and if the Contractor or COR finds them necessary or advantageous to progress of work.
- B. Contractor, those subcontractors and those material suppliers concerned with current progress or with the scheduling of future progress, and the Government shall each be represented at these meetings by persons familiar with the details of work and authorized to conclude matters relating to work progress.

END OF SECTION 27 0101

## SECTION 27 0500 - COMMON WORK RESULTS FOR COMMUNICATIONS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Requirements applicable to work of more than one section of Division 27.
- B. Communications identification.
- C. Testing wiring systems.

#### 1.2 RELATED SECTIONS

- A. Operation and Maintenance Manuals: Division 01 and Section 27 0101.

#### 1.3 DEFINITIONS

- A. Project correction period: A period after Substantial Completion of the work during which the Contractor shall correct every part of the work found to be not in accordance with the requirements of the contract documents, promptly after receipt of written notice.
- B. Qualified testing agency: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
  - 1. NRTL: A national recognized testing laboratory according to 29 CFR 1910.7.
  - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

#### 1.4 DESIGN REQUIREMENTS

- A. The drawings and system performances have been designed on the basis of using the particular manufacturers' products specified and scheduled on the drawings.
- B. Products of other manufacturers that are listed under the article "Available Manufacturers," or permitted as "equal," are permitted provided:
  - 1. Product shall meet the specifications.
  - 2. Contractor shall make, without addition to the contract sum, all adjustments for deviations so that the final installation is complete and functions as the design basis product is intended.
- C. Do not propose products with dimensions or other characteristics different from the design basis product that make their use impractical or cause functional fit, access, or connection problems.
- D. The contract drawings are generally diagrammatic, and do not indicate all fittings or offsets in conduit or all pull boxes, access panels, or other specialties required.
  - 1. Install conduit exposed to view parallel with the lines of the building and as close to walls, columns, and ceilings as may be practical, maintaining adequate clearance for access at parts requiring servicing.

2. Install conduit a sufficient distance from other work to permit a clearance of not less than 0.5 inch (15 mm) between its finished covering and adjacent work.
3. No conduit shall be run below the head of a window or door.
4. Pull boxes and other appurtenances which require operation or maintenance shall be easily accessible. Do not cut or form handholes for operation or maintenance of appliances through walls or ceilings.

#### 1.5 SUBMITTALS

- A. Test reports: Show that tests specified in Part 3 below demonstrate the specified results.

#### 1.6 QUALITY ASSURANCE

- A. Provide materials and perform work in accordance with the electrical, building, fire, and safety codes and regulations of the state, county, or city in which the work is performed.
- B. Communications equipment, materials and devices provided or installed as work of Division 27 shall bear UL label, or, if UL label is not available, the item shall be tested and labeled by a qualified testing agency, acceptable to authorities having jurisdiction, and in accordance with NFPA 70. Provide testing, if required, without addition to the contract sum.
- C. VOC content: Field-applied adhesives and sealants, limits per South Coast Air Quality Management District (SCAQMD), Rule No. 1168.
- D. Products shall contain no urea-formaldehyde content.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Telephone, data, and communications equipment backing panels: Plywood, DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated in accordance with AWPA C27, in thickness indicated, not less than 0.5 inch (13 mm) nominal.
  1. One side finished.
- B. Wood-preservative-treated lumber: Treated by pressure process, AWPA C2, with chemicals acceptable to authorities having jurisdiction, and marked with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
  1. Application: Treat items indicated on the drawings, and the following:
    - a. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, or waterproofing.
    - b. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry or concrete.
    - c. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
    - d. Wood framing members that are less than 18 inches (460 mm) above the ground in crawlspaces or unexcavated areas.
    - e. Wood floor plates that are installed over concrete slabs-on-grade.
- C. Nameplates: Laminated plastic, engraved, white letters on black background, except where other colors are noted or specified.

1. Size: Minimum 0.75 inch (19 mm) by 2.5 inches (64 mm).
  2. Letter size: Minimum height 0.1875 inch (5 mm).
  3. Fasteners: Vandalproof brass screws or rivets.
- D. Aircraft cable: 0.25-inch (6-mm) steel wire rope, galvanized, construction 7 by 19 strands, minimum 7000 lbs (31138 N) breaking strength.

## 2.2 DATE-SENSITIVE EQUIPMENT

- A. Date-sensitive equipment: Systems, equipment, or components which use or process date and time data in order to perform their functions.
- B. Each item of date-sensitive equipment used in the project shall be warranted by the manufacturer to properly function and correctly use or process all time-related data for all dates and times which occur during a reasonable life expectancy of the equipment.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF PRODUCTS AND EQUIPMENT

- A. Manufacturers' instructions: Except as modified by drawings or specifications, install products and equipment in accordance with manufacturers' instructions and recommendations applicable to the project conditions.
1. Immediately notify the COR if a difference or discrepancy is found between manufacturers' instructions and the drawings or specifications.
- B. Install plywood backing panels with finished face exposed.

### 3.2 IDENTIFICATION

- A. Items to be identified include, but are not limited to:
1. Voice and data communications systems and devices.
- B. Identify function, equipment services, and area served.

### 3.3 TESTS

- A. During the progress of the work and after completion, test the communications cabling and wiring systems.
- B. Results of the tests shall show that the wiring meets the requirements of this specification. Should any test indicate defect in materials or workmanship, immediately repair, or replace with new, the faulty installation, and retest the affected portions of the work.
- C. Furnish equipment and instruments necessary for testing.
- D. Tests shall demonstrate the following:
1. Power, control, and system circuits are continuous and free from short circuits.
  2. Circuits are free from unspecified grounds.
  3. The resistance to ground of each non-grounded circuit is not less than one megohm.

4. Circuits are properly connected in accordance with the applicable wiring diagrams.
5. Circuits are operable.

E. Immediately repair defects and retest until systems are operating correctly.

F. Submit test reports.

### 3.4 OPERATING INSTRUCTIONS

- A. Furnish the necessary technicians, skilled workers, and helpers to operate the communications systems and equipment of the entire project for one 8-hour day.
- B. Where specified in technical sections, provide longer periods required for specialized equipment.
- C. Instruct the Government's designated personnel in operation, maintenance, lubrication, and adjustment of systems and equipment.
- D. The Operating and Maintenance Manual shall be available at the time of the instructions for use by instructors and Government personnel.
- E. Schedule the general and specialized instruction periods for a time agreed upon by the COR

END OF SECTION 27 0500

## SECTION 27 1500 - VOICE AND DATA COMMUNICATIONS CABLING

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Wire, cable, connecting devices, installation, and testing for wiring systems to be used as signal pathways for voice and high-speed data transmission.

#### 1.2 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. IDC: Insulation displacement connector.
- C. LAN: Local area network.
- D. PVC: Polyvinyl chloride.
- E. STP: Shielded twisted pair.
- F. UTP: Unshielded twisted pair.

#### 1.3 SUBMITTALS

- A. Product data: Include data on features, ratings, and performance for each component specified.
- B. Shop drawings: Include dimensioned plan and elevation views of each individual component. Show equipment assemblies, method of field assembly, workspace requirements, and access for cable connections.
  - 1. System labeling schedules, including electronic copy of labeling schedules, as specified in Part 3, in software and format selected by the Government.
  - 2. Wiring diagrams. Show typical wiring schematics including the following:
    - a. Workstation outlets, jacks, and jack assemblies.
- C. Cable Administration Drawings: As specified in Part 3.
- D. Product certificates: For each type of cable, connector, and terminal equipment, signed by product manufacturer.
- E. Qualification data: For installer.
- F. Field quality-control test reports.
- G. Operation and maintenance data: For voice and data communication cabling to include in emergency, operation, and maintenance manuals.

#### 1.4 QUALITY ASSURANCE

- A. Installer qualifications: System installer must have on staff a registered communication distribution designer certified by Building Industry Consulting Service International.
- B. Source limitations: Obtain all products except twisted-pair and fiber-optic cables through one source from a single manufacturer.
- C. Electrical components, devices, and accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Comply with NFPA 70.

#### 1.5 COORDINATION

- A. Coordinate layout and installation of voice and data communication cabling with the COR telecommunications and LAN equipment suppliers. Coordinate service entrance arrangement with local exchange carrier.
  - 1. Meet jointly with telecommunications and LAN equipment suppliers, local exchange carrier representatives, and COR to exchange information and agree on details of equipment arrangements and installation interfaces.
  - 2. Record agreements reached in meetings and distribute to other participants.
  - 3. Adjust arrangements and locations of distribution frames and cross-connect and patch panels in equipment rooms and wiring closets to accommodate and optimize arrangement and space requirements of telephone switch and LAN equipment.

#### 1.6 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Cable: 250 feet (76 m) of each size and type used for Project. Furnish on reels.
  - 2. Patch-panel units: One of each type for every six installed, but no less than one.
  - 3. Connecting blocks: One of each type for every 25 installed, but no less than one.
  - 4. Outlet assemblies: One of each type for every 25 installed, but no less than one.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Cable:
    - a. Belden Inc.; Electronics Division.
    - b. Lucent Technologies; Global Service Provider.
    - c. Mohawk/CDT; a division of Cable Design Technologies.
    - d. Superior Essex; Superior Telecommunications Inc.
    - e. Or approved equal.
  - 2. Terminal and connector components and distribution racks:



- a. AMP Incorporated; a Tyco International Ltd. Company.
- b. Hubbell Premise Wiring.
- c. Leviton Telecom.
- d. Lucent Technologies; Global Service Provider.
- e. Or approved equal.

## 2.2 SYSTEM REQUIREMENTS

- A. General: Coordinate the features of materials and equipment so they form an integrated system. Match components and interconnections for optimum future performance.
- B. Expansion capability: Unless otherwise indicated, provide spare conductor pairs in cables, positions in cross-connect and patch panels, and terminal strips to accommodate 20 percent future increase in active workstations.

## 2.3 MOUNTING ELEMENTS

- A. Raceways and boxes: Comply with Sections 26 0533 and 26 0534.
- B. Backboards: 0.75-inch (19-mm), interior-grade, fire-retardant-treated plywood.

## 2.4 TWISTED-PAIR CABLES, CONNECTORS, AND TERMINAL EQUIPMENT

- A. Cables: Listed as complying with Category 6 of TIA/EIA-568-A.
- B. Conductors: Solid copper.
- C. UTP cable: Comply with TIA/EIA-568-A. Four, thermoplastic-insulated, individually twisted pairs of conductors; No. 24 AWG, color-coded; enclosed in PVC jacket.
- D. UTP plenum cable: Listed for use in air-handling spaces. Features are as specified for cables, conductors, except materials are modified as required for listing.
- E. UTP cable connecting hardware: Comply with TIA/EIA-568-A. IDC type, using modules designed for punch-down caps or tools.
  1. IDC terminal block modules: Integral with connector bodies, including plugs and jacks where indicated.
  2. IDC connecting hardware: Consistent throughout project.
- F. Jacks and jack assemblies for UTP cable: Modular, color-coded, RJ-45 receptacle units with integral IDC-type terminals. Use keyed jacks for data service. Color as selected by the COR.
- G. UTP patch cords: Four-pair cables in 48-inch (1200-mm) lengths, terminated with RJ-45 plug at each end. Use keyed plugs for data service.
- H. Workstation outlets:
  1. Faceplate: High-impact plastic; color as selected by the COR.
  2. Mounting: Flush, unless otherwise indicated.
  3. Legend: As indicated on drawings, by silk-screening or engraving.

## 2.5 IDENTIFICATION PRODUCTS

- A. Comply with Division 27 Section "Common Work Results for Communications" and the following:
  - 1. Cable labels: Self-adhesive vinyl or vinyl-cloth wraparound tape markers, machine printed with alphanumeric cable designations.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine pathway elements intended for cables. Check raceways and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 APPLICATION OF MEDIA

- A. Horizontal cable for data service: Use UTP Category 6 cable for runs between wiring closets and workstation outlets.
- B. Horizontal cable for voice service: Use UTP Category 6 cable for runs between wiring closets and workstation outlets.

#### 3.3 INSTALLATION

- A. Wiring method: Install wiring in raceway and cable tray except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces. Use UL-listed plenum cable in environmental air spaces, including plenum ceilings.
- B. Install cables using techniques, practices, and methods that are consistent with Category 6 rating of components and that ensure Category 6 performance of completed and linked signal paths, end to end.
- C. Install cables without damaging conductors, shield, or jacket.
- D. Do not bend cables, in handling or in installing, to smaller radii than minimums recommended by manufacturer.
- E. Pull cables without exceeding cable manufacturer's recommended pulling tensions.
  - 1. Pull cables simultaneously if more than one is being installed in same raceway.
  - 2. Use pulling compound or lubricant if necessary. Use compounds that will not damage conductor or insulation.
  - 3. Use pulling means, including fish tape, cable, rope, and basket-weave wire or cable grips, that will not damage media or raceway.
- F. Install exposed cables parallel and perpendicular to surfaces or exposed structural members and follow surface contours where possible.
- G. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
- H. Wiring in closets and enclosures: Provide conductors of adequate length. Train conductors to terminal points with no excess. Use lacing bars to restrain cables, to prevent straining

connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.

- I. Separation of wires: Comply with TIA/EIA-569-A rules for separating unshielded copper voice and data communication cabling from potential EMI sources, including electrical power lines and equipment.
- J. Make splices, taps, and terminations only at indicated outlets, terminals, and cross-connect and patch panels.
- K. Use splice and tap connectors compatible with media types.

### 3.4 GROUNDING

- A. Comply with Section 26 0526, Grounding and Bonding.
- B. Ground equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.
- C. Signal ground terminal: Locate in each equipment room and wiring closet; isolate from power system and equipment grounding.
- D. Signal ground bus: Mount on wall of main equipment room with standoff insulators.
- E. Signal ground backbone cable: Extend from signal ground bus to signal ground terminal in each equipment room and wiring closet.

### 3.5 INSTALLATION STANDARDS

- A. Comply with requirements in TIA/EIA-568-A and TIA/EIA-569-A.

### 3.6 IDENTIFICATION

- A. In addition to requirements in this Article, comply with applicable requirements in Section 27 0500, Common Work Results for Communications, and TIA/EIA-606.
- B. System: Use a unique, three-syllable, alphanumeric designation for each cable, and label cable and jacks, connectors, and terminals to which it connects with same designation. Use logical and systematic designations for facility's architectural arrangement.
  - 1. First syllable identifies and locates equipment room or wiring closet where cables originate.
  - 2. Second syllable identifies and locates cross-connect- or patch-panel field in which cables terminate.
  - 3. Third syllable designates type of media (copper or fiber) and position occupied by cable pairs or fibers in field.
- C. Workstation: Label cables within outlet boxes.
- D. Distribution racks and frames: Label each unit and field within that unit.
- E. Within connector fields in equipment rooms and wiring closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.

- F. Cables, general: Label each cable within 4 inches (100 mm) of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
- G. Exposed cables and cables in cable trays: Label each cable intervals not exceeding 15 feet (4.5 m).
- H. Cable schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project, in software and format selected by the Government.
- I. Cable administration drawings: Show building floor plans with cable administration point labeling. Identify labeling convention and show labels for telecommunications closets, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of TIA/EIA-606. Furnish electronic record of all drawings, in software and format selected by the Government.

### 3.7 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
  - 1. Operational test: After installation of cables and connectors, demonstrate product capability and compliance with requirements. Test each signal path for end-to-end performance from each end of all pairs installed. Remove temporary connections when tests have been satisfactorily completed.
  - 2. Copper cable procedures: Inspect for physical damage and test each conductor signal path for continuity and shorts. Use Class 2, bidirectional, Category 5 tester. Test for faulty connectors, splices, and terminations. Test according to TIA/EIA-TSB67, "Transmission Performance Specifications for Field Testing of Unshielded Twisted-Pair Cabling Systems." Link performance for UTP cables must meet minimum criteria of TIA/EIA-568-A.
- B. Remove malfunctioning units, replace with new units, and retest as specified above.

### 3.8 DEMONSTRATION

- A. As required in Section 27 0500, provide operating instructions.
- B. Train Government's maintenance personnel in cable-plant management operations, including changing signal pathways for different workstations, rerouting signals in failed cables, and extending wiring to establish new workstation outlets.

END OF SECTION 27 1500

## SECTION 28 0101 - ELECTRONIC SAFETY AND SECURITY GENERAL PROVISIONS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. General provisions and requirements for electronic safety and security work.

#### 1.2 RELATED SECTIONS

- A. Requirements of this section generally supplement requirements of Division 01.

#### 1.3 REFERENCES

- A. NFPA 10: Portable Fire Extinguishers.
- B. NFPA 241: Safeguarding Construction, Alteration, and Demolition Operations.

#### 1.4 SYSTEM DESCRIPTION

- A. The full set of Contract Documents applies to work of Division 28.
- B. Visit the site and study all aspects of the project and working conditions, as required by General and Supplementary Conditions, Bidding and Contracting Requirements, Drawings, and Specifications. Verify field dimensions.
- C. The work covered in technical sections includes the furnishing of all labor, equipment and materials, and the performance of all operations pertinent to the work described.
- D. Except as required otherwise in Division 01, promptly obtain and pay for, all necessary signatures and paperwork, all permits, fees and inspections required for work of this division by authorities having jurisdiction, including any utility connection or extension charge. No payment will be made until a copy of the permit is forwarded to the Government.
- E. Electronic safety and security work of this project includes, as a brief general description, the following:
  - 1. Provide modifications and new devices to existing fire alarm system.
- F. See Division 01 for requirements related to Government's occupancy of the premises, limits on use of site, time restrictions on work, limits on utility outages or shutdowns, and phasing (sequencing) and scheduling.

#### 1.5 PRODUCT OPTIONS

- A. Except as modified by provisions of Bidding and Contracting Requirements and Division 01, these options apply to Division 28 specifications.
- B. General: Where Contractor is permitted to use a product other than the specified item and model named as the basis of design, Contractor is responsible for all coordination and additional costs as specified in article "Substitutions" below for substitutions.

- C. Products specified by reference standards or by description only: Any product meeting those standards or description.
- D. Products specified by naming one or more manufacturers, or model name or catalog reference number: Products specified establish a standard of quality, options to be included, and performance and shall not be construed as limiting competition. Contractor may use products of any manufacturer, which meet the specifications.
- E. Products specified by naming one manufacturer and particular product, with no provision for other options: No options or substitutions allowed.

#### 1.6 SUBSTITUTIONS

- A. Substitutions will be considered only as permitted or required by the Bidding and Contracting Requirements and Division 01. Except as modified by those requirements, the requirements below apply to Division 28 specifications.
- B. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.
- C. Document each request with complete data substantiating compliance of proposed substitution with contract documents.
- D. A request constitutes a representation that the Bidder or Contractor:
  - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
  - 2. Will provide the same warranty for the substitution as for the specified product.
  - 3. Will coordinate installation and make changes to other work which may be required for the work to be complete with no additional cost to the Government.
  - 4. Waives claims for additional costs or time extension which may subsequently become apparent.
  - 5. Will reimburse the Government for review or redesign services associated with re-approval by authorities.
- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitution submittal procedure is specified in Bidding and Contracting Requirements and Division 01.

#### 1.7 MATERIALS AND EQUIPMENT

- A. All materials and equipment shall be new and the best of their respective kinds, suitable for the conditions and duties imposed on them by the project and of representative manufacturer. The description, characteristics and requirements of the materials to be used shall be in accordance with the specifications.
- B. All equipment, construction and installation must meet requirements of local, state and federal governing codes.

- C. Singular number: In cases where material, a device, or part of the equipment is referred to in the singular number in the specifications, it is intended that such reference shall apply to as many items of material, devices, or parts of the equipment as are required to complete the installation as shown on the drawings or required for proper operation of the system.
- D. Terms have the following meanings:
  - 1. Furnish: Supply item
  - 2. Install: Mount and connect item
  - 3. Provide: Furnish and install
- E. All materials and equipment shall be installed and completed in a first class and workmanlike manner and in accordance with the best modern methods, practice and manufacturer's instructions. Any work which shall not present an orderly and neat or workmanlike appearance shall be removed and replaced with satisfactory work when so directed in writing by the COR.
- F. The specifications and drawings are intended to define the minimum requirements, as to quality of materials, construction, finish and overall workmanship.
- G. General Conditions describe the correlation and intent of the Contract Documents. In case of discrepancies between the specifications and drawings, the specifications should be followed as to the general methods and principles and the drawings followed as to sizes, capacities and specifics for corresponding parts. If sizes are omitted, the COR will determine sizes to be utilized.
- H. In all cases of doubt, uncertainty, or conflict as to the true meaning of the specifications or drawings, it is the responsibility of the Contractor to notify the COR of said uncertainty, doubt, or conflict and obtain a decision as to the intent prior to initiating any work which may be affected by this decision.

#### 1.8 COORDINATION

- A. Should a situation develop during construction to prevent the proper installation of any equipment or item where shown on the drawings, call the situation to the attention of the COR and await a written decision.
- B. Plan and coordinate all work to proceed in an orderly and continuous manner without undue delay, and in conformance with the project schedule. Submit samples, shop drawings, schedules, insurance policies and certificates, and the like in time to avoid delays in actual construction. Coordinate electronic safety and security work so that work of each trade is completed before other construction begins which would obstruct it.
- C. Coordinate trades to ensure that proper clearances between work of the various trades allow access to items which require operation and maintenance.
- D. Coordinate location and elevation of all conduit, light fixtures, equipment, and appurtenances in such a manner that the finished installation is as indicated on drawings. In the event difficulties are encountered which prevent this, it is the Contractor's responsibility to bring this to the attention of the COR prior to initiation of work. Correct improperly coordinated installation at no additional cost.
- E. The Contractor's assistants shall include a competent electronic safety and security foreman, who shall be on the premises at all times to check, layout, coordinate and superintend the installation of work. The foreman shall establish all basic requirements relative to the work before starting, and be responsible for the accuracy thereof.

## 1.9 SUBMITTALS

### A. Manufacturers' and subcontractors' lists:

1. As specified in Division 01, submit a complete list of proposed manufacturers for all equipment, materials and subcontractors used for the work of this division. Lists shall follow the sequence of the specifications. No considerations will be given for partial or incomplete lists. After review of lists, submit shop drawings and product data.

### B. Shop drawings and product data:

1. Submit in accordance with the requirements of Division 01 or as established at the preconstruction conference, the required number of copies of Shop Drawings and Product Data for every item of equipment. Shop drawings or product data will not be considered until Manufacturers' Lists have been approved. Shop drawings and product data shall be submitted, as required by the General Conditions, with sufficient time for checking, return to Contractor, and resubmission as required before Contractor shall install any item.
2. Each item submitted shall be properly labeled, indicating the specific service for which the equipment or material is to be used, section and paragraph number of specification or drawing number to which it applies, Contractor's name and project name and number. Data submitted shall be specific and shall include product data and printed information in sufficient detail and scope to verify compliance with requirements of the contract documents. Clearly identify each item within the data. Data of a general nature will not be accepted. Each sheet must clearly show the project name and number.
3. The review of a shop drawing or product data shall not be considered as a guarantee of the measurements or building conditions or that the shop drawings or product data have been checked to see that item submitted properly fits the building conditions. This review shall not relieve the Contractor of the responsibility for furnishing material or performing work as required by the contract documents, for correctness of dimensions and quantities, or for proper coordination of details and interfaces among trades.
4. All exclusively electronic safety and security items furnished as items associated with mechanical items but not specifically described in the mechanical item submission, shall be submitted as a separate submittal but shall be clearly marked as associated with the mechanical item by identified specification paragraph.
5. Product data sheets shall be 8.5-inches by 11-inches cut sheets for operating and maintenance manual.

### C. Submit at least three copies of the results of every test required under any section in this division.

### D. Specialist shall submit a list of at least three projects similar to this project in type, size, and quality, which have been in place and operating satisfactorily for at least five years.

1. Include project name, address, name and phone number of Government's representative, and project type and size.

### E. After the work is completed, submit all required certificates of approval from approved inspection agencies and authorities having jurisdiction over work of this division. Certificates of approval must be received by the COR prior to final acceptance of the work.

## 1.10 SPECIALIST

- A. The term "Specialist" as used in the specification shall mean an individual or firm of established reputation (or, if newly organized, whose personnel have previously established a reputation in the same field,) which is regularly engaged in, and which maintains a regular force of workers skilled



in either (as applicable) manufacturing or fabricating items required by the contract, installing items required by the contract, or otherwise performing work required by the contract. Where the specification requires installation by a specialist, the term shall also be deemed to mean the manufacturer of the item, an individual or firm licensed by the manufacturer, or an individual or firm who will perform the work under the manufacturer's direct supervision.

#### 1.11 CONTRACT CLOSEOUT SUBMITTALS

##### A. Project record documents:

1. Maintain on site one set of the following record documents; record actual revisions to the work of this division:
  - a. Contract drawings.
  - b. Specifications.
  - c. Addenda.
  - d. Change orders and other modifications to the Contract.
  - e. Reviewed shop drawings, product data, and samples.
2. Maintain record documents separate from documents used for construction.
3. Record information concurrent with construction progress.
4. Specifications: Legibly mark and record in each section a description of actual products installed, including the following:
  - a. Manufacturer's name and product model and number.
  - b. Product options, substitutions, or alternates utilized.
  - c. Changes made by addenda and modifications.
5. Record documents and shop drawings: Legibly mark each item to record actual construction, including:
  - a. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the work.
  - b. Field changes of dimension and detail.
  - c. Details not on original Contract Drawings.
6. Submit documents as specified in Division 01.

##### B. Operation and maintenance data:

1. Submit sets prior to final inspection as specified in Division 01. Unless otherwise specified in Division 01, submit no fewer than three sets. In addition to requirements specified in Division 01, submit operating and maintenance manuals for the work of this division as specified below.
2. Binders: Provide large enough binders, and sufficient quantity, that the required contents can be easily turned, removed, and reinserted.
  - a. Self-expanding fast lock type.
  - b. Three telescoping metal posts.
  - c. Durable plastic covers.
  - d. Angle spline with guide flanges.
  - e. Text page size - 8.5 by 11 inches.
  - f. Boorum and Pease, Stock No. C-619-3 expansion 3 inch to 5 inch or Stock No. C-1219 expansion 1.5 inch to 2.5 inch, or equal by National or Wilson Jones.

3. Prepare binder covers with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", and title of project. Print on spine of binder "O & M INSTRUCTIONS." If more than one binder is required, print covers and spines with volume numbers. Include in the front of every binder an index to all binders.
4. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
5. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, typed on white paper.
6. Part 1: Directory, listing names, addresses, and telephone numbers of engineers; contractor; electronic safety and security subcontractors; and major electronic safety and security equipment suppliers.
7. Part 2: Operation and maintenance instructions, arranged by specification section. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify the following:
  - a. Significant design criteria.
  - b. List of equipment.
  - c. Parts list for each component, including recommended spare parts list.
  - d. Operating instructions.
  - e. Maintenance instructions for equipment and systems.
  - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.
8. Part 3: Project documents and certificates, including the following:
  - a. Shop drawings and product data.
  - b. Photocopies of certificates.
  - c. Photocopies of warranties, guarantees, and bonds.
  - d. Test reports: Copies of the results of all tests required under all sections of specifications.
9. Submit one copy of completed volumes in final form 15 days prior to final inspection. This copy will be returned after final inspection, with Engineer comments. Revise content of documents as required prior to final submittal.
10. Submit final volumes revised, within ten days after final inspection.

#### 1.12 REGULATORY REQUIREMENTS

- A. When these specifications call for materials or construction of a better quality or larger sizes than required by the following codes and standards, the provisions of the specifications shall take precedence.
- B. Provide, without extra charge, any additional materials and labor which may be required for compliance with these codes and standards even though the work is not mentioned in these specifications or shown on the contract drawings.
- C. Perform the work of this division in strict accordance with the following authorities. The latest revision of these codes accepted by the authority having jurisdiction as of the date of the contract documents shall apply.
  1. The electrical, building, fire, and safety codes of the state and county or city in which the work is being performed.
  2. The National Electric Code, NFPA 70 (NEC).
  3. The National Fire Protection Association Code. (NFPA)

4. International Building Code (IBC).
5. International Energy Conservation, Fire, and Electrical Codes (ICC).

#### 1.13 REFERENCE STANDARDS

- A. Perform the work of this division using the standards of the following organizations, as referred to in technical sections, as a minimum requirement for construction and testing. Unless specified otherwise in Bidding and Contract Documents or Division 01, the latest revision current as of the date of the contract documents shall apply.
1. Federal Specifications (FS)
  2. Military Specification (MS)
  3. Military Standards (Mil. Std.)
  4. American National Standards Institute (ANSI)
  5. American Society for Testing and Materials (ASTM)
  6. International Code Council (ICC)
  7. Institute of Electrical and Electronics Engineers (IEEE)
  8. National Electrical Code (NEC) (NFPA 70)
  9. National Electrical Manufacturer's Association (NEMA)
  10. National Fire Protection Association (NFPA)
  11. The Occupational Safety and Health Act (OSHA)
  12. Underwriters Laboratory Inc. (UL)
  13. Maryland Occupational Safety and Health Act (MOSHA)

#### 1.14 TEMPORARY STORAGE

- A. Maintain upon premises, where directed, a storage area, and be responsible for all contents within these areas. Provide all security measures necessary for this area.
- B. Area shall be maintained and shall be returned to original condition at the completion of the project.
- C. Store electronic safety and security construction materials such as wire, raceways and boxes, devices, and equipment in buildings, enclosed trailers, or portable enclosed warehouses.
1. Materials and products subject to damage from moisture: Store in dry locations. If necessary, protect with protective wraps or covers.
  2. Plastics and other materials and products subject to damage from heat or cold: Store at manufacturer's recommended temperatures.
  3. Plastics and other materials and products subject to damage from sunlight: Protect from sunlight.
- D. Electronic safety and security equipment stored before installation and installed during construction: Provide clean, dry locations at manufacturer's recommended temperatures, and cover or wrap if required to protect from incidental damage.

#### 1.15 PROTECTION

- A. Control dust resulting from construction work to prevent its spread beyond the immediate work area, and to avoid creation of a nuisance.
1. Do not use water to control dust. Use drop cloths or other suitable barriers.
  2. In areas where dirt or dust is produced as a result of the work, sweep daily, or more often as required.
  3. Provide walk-off mats at entries and replace them at regular intervals.

4. Construct dust partitions, where indicated on the drawings or as required.
  5. Protect areas occupied by Government personnel or equipment.
  6. Seal off all return air registers and other mechanical systems to prevent dust from entering.
- B. Each trade and subcontractor is responsible for preventing damage and soiling of work performed by other trades or subcontractors. Each trade and subcontractor is responsible for providing temporary protection of its own work.
1. Protect work from spills, splatters, drippings, adhesives, bitumens, mortars, paints, plasters, and damage from welding or burning.
  2. Protect finished work from damage, defacement, staining, or scratching.
  3. Protect finishes from cleaning agents, or grinding and finishing equipment.
  4. Protect adjacent and finished work from damage, using tape, masking, covers or coatings and protective enclosures.
  5. Coordinate installations and temporarily remove items to avoid damage from finishing work.
- C. Repair all damage or soiling to the complete satisfaction of the COR; replace any materials or work damaged to such an extent that they cannot be restored to their original condition, all at no addition to the Contract sum.
- D. Protect work stored in place and supplies stored in the building.
1. Store materials and products, subject to damage from moisture, in dry locations. If necessary, protect in wraps or covers.
  2. Store plastics, other materials, and products subject to damage from heat or cold at manufacturer's recommended temperatures.
- E. Protect electronic safety and security materials and products from weather events and accidents of construction.
- F. Use of sidewalk or roadway areas outside of the property lines shall be with permission and approval of the local authorities having jurisdiction.

#### 1.16 FIRE PROTECTION

- A. As a minimum, provide hand-carried, portable, UL-rated extinguishers with each work crew working inside the building.
- B. Select extinguishers in accordance with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

#### 1.17 PROJECT CONDITIONS

- A. Drawings showing utilities in concealed locations are based on the best information available but are not represented as being precisely correct. Work of the contract includes digging, cutting, drilling, using nondestructive methods, and other methods of locating concealed utilities in the field, as well as patching and repairing as specified in "Cutting and Patching" below.
- B. If, in the course of the work, workers encounter a material they suspect to present some hazard:
  1. Promptly notify the COR in writing.
  2. Do not perform any work which would disturb the suspected material until written instructions have been received.

### 1.18 WARRANTY

- A. All work and equipment provided as work of this division shall be fully warranted under the general project warranty. In addition, provide added special warranties as specified in individual sections.
- B. During the correction period, the Contractor shall promptly correct any work found to be defective or otherwise not in accordance with the requirements of the Contract Documents, on receipt of written notice from the COR. Except as otherwise required in General Conditions and Division 01, the correction period is one year after the date of substantial completion of the work. Work requiring correction shall promptly be repaired or completely replaced at no addition to the Contract Sum.
- C. When use of the permanent equipment has been permitted for temporary services during construction of the building, the warranty and correction periods shall nevertheless begin at the time of substantial completion, unless another date of acceptance has been agreed to by the Government.
- D. Special warranties are warranties required by individual specification sections, incidental product warranties, manufacturers' standard warranties, installer or subcontractor service agreements, and other individual warranties in addition to the general project warranty.
- E. Provide copies of warranties as required for Operation and Maintenance Manual specified above, and by Division 01.
- F. For items of work delayed beyond date of substantial completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

### PART 2 - PRODUCTS

Not used.

### PART 3 - EXECUTION

#### 3.1 CUTTING AND PATCHING

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
- B. Cut walls, floors, partitions, roofs, and other appurtenances for the passage or accommodation of raceways. Close superfluous openings and remove all debris caused by work of this division.
- C. No cutting of any structure or finish shall be done until the condition requiring such cutting has been examined and approved by the COR.
- D. New or existing surfaces disturbed as a result of such cutting or otherwise damaged shall be restored to match original work and all materials used for any patching or mending shall conform to the class of materials originally installed.
- E. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

#### 3.2 TEMPORARY FACILITIES

- A. Temporary water facilities, electricity, telephone, toilet facilities, and temporary heat, shall be provided as specified in Division 01.

### 3.3 PROGRESS MEETINGS

- A. Progress meetings shall be held as specified in Division 01, and also when and if the Contractor or COR finds them necessary or advantageous to progress of work.
- B. Contractor, those subcontractors and those material suppliers concerned with current progress or with the scheduling of future progress, and the Government shall each be represented at these meetings by persons familiar with the details of work and authorized to conclude matters relating to work progress.

END OF SECTION 28 0101

## SECTION 28 0500 - COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Requirements applicable to work of more than one section of Division 28.
- B. Electronic safety and security identification.
- C. Testing wiring systems.

#### 1.2 RELATED SECTIONS

- A. Operation and maintenance manuals: Division 01 and Section 28 0101.

#### 1.3 DEFINITIONS

- A. Project correction period: A period after Substantial Completion of the work during which the Contractor shall correct every part of the work found to be not in accordance with the requirements of the contract documents, promptly after receipt of written notice.
- B. Qualified testing agency: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
  - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
  - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

#### 1.4 DESIGN REQUIREMENTS

- A. The drawings and system performances have been designed on the basis of using the particular manufacturers' products specified and scheduled on the drawings.
- B. Products of other manufacturers that are listed under the article "Available Manufacturers," or permitted as "equal," are permitted provided:
  - 1. Product shall meet the specifications.
  - 2. Contractor shall make, without addition to the contract sum, all adjustments for deviations so that the final installation is complete and functions as the design basis product is intended.
- C. Do not propose products with dimensions or other characteristics different from the design basis product that make their use impractical or cause functional fit, access, or connection problems.
- D. The contract drawings are generally diagrammatic, and do not indicate all fittings or offsets in conduit or all pull boxes, access panels, or other specialties required.
  - 1. Install conduit exposed to view parallel with the lines of the building and as close to walls, columns, and ceilings as may be practical, maintaining adequate clearance for access at parts requiring servicing.
  - 2. Install conduit a sufficient distance from other work to permit a clearance of not less than 0.5

- inch (15 mm) between its finished covering and adjacent work.
3. No conduit shall be run below the head of a window or door.
  4. Pull boxes and other appurtenances which require operation or maintenance shall be easily accessible. Do not cut or form handholes for operation or maintenance of appliances through walls or ceilings.

#### 1.5 SUBMITTALS

- A. Test reports: Show that tests specified in Part 3 below demonstrate the specified results.

#### 1.6 QUALITY ASSURANCE

- A. Provide materials and perform work in accordance with the electrical, building, fire, and safety codes and regulations of the state, county, or city in which the work is performed.
- B. Electronic safety and security equipment, materials and devices provided or installed as work of Division 28 shall bear UL label, or, if UL label is not available, the item shall be tested and labeled by a qualified testing agency, acceptable to authorities having jurisdiction, and in accordance with NFPA 70. Provide testing, if required, without addition to the contract sum.
- C. VOC content: Field-applied adhesives and sealants, limits per South Coast Air Quality Management District (SCAQMD), Rule No. 1168.
- D. Products shall contain no urea-formaldehyde content.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Electronic equipment backing panels: Plywood, DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated in accordance with AWWA C27, in thickness indicated, not less than 0.5 inch (13 mm) nominal.
  1. One side finished.
- B. Wood-preserved-treated lumber: Treated by pressure process, AWWA C2, with chemicals acceptable to authorities having jurisdiction, and marked with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
  1. Application: Treat items indicated on the drawings, and the following:
    - a. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, or waterproofing.
    - b. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry or concrete.
    - c. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
    - d. Wood framing members that are less than 18 inches (460 mm) above the ground in crawlspaces or unexcavated areas.
    - e. Wood floor plates that are installed over concrete slabs-on-grade.
- C. Nameplates: Laminated plastic, engraved, white letters on black background, except where other colors are noted or specified.



1. Size: Minimum 0.75 inch (19 mm) by 2.5 inches (64 mm).
2. Letter size: Minimum height 0.1875 inch (5 mm).
3. Fasteners: Vandalproof brass screws or rivets.

D. Aircraft cable: 0.25-inch (6-mm) steel wire rope, galvanized, construction 7 by 19 strands, minimum 7000 lbs (31138 N) breaking strength.

## 2.2 DATE-SENSITIVE EQUIPMENT

- A. Date-sensitive equipment: Systems, equipment, or components which use or process date and time data in order to perform their functions.
- B. Each item of date-sensitive equipment used in the project shall be warranted by the manufacturer to properly function and correctly use or process all time-related data for all dates and times which occur during a reasonable life expectancy of the equipment.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF PRODUCTS AND EQUIPMENT

- A. Manufacturers' instructions: Except as modified by drawings or specifications, install products and equipment in accordance with manufacturers' instructions and recommendations applicable to the project conditions.
  1. Immediately notify the COR if a difference or discrepancy is found between manufacturers' instructions and the drawings or specifications.
- B. Install plywood backing panels with finished face exposed.

### 3.2 IDENTIFICATION

- A. Items to be identified include, but are not limited to:
  1. Control devices.
  2. Cables.
  3. Control panels.
  4. Equipment
  5. Other appurtenances.
- B. Identify function, equipment served, and area served.

### 3.3 TESTS

- A. During the progress of the work and after completion, test the circuits, and electronic safety and security system, and the low voltage alarm and signal systems.
- B. Results of the tests shall show that the wiring meets the requirements of this specification. Should any test indicate defect in materials or workmanship, immediately repair, or replace with new, the faulty installation, and retest the affected portions of the work.
- C. Furnish equipment and instruments necessary for testing.
- D. Tests shall demonstrate the following:

1. Power, control, and system circuits are continuous and free from short circuits.
2. Circuits are free from unspecified grounds.
3. The resistance to ground of each non-grounded circuit is not less than one megohm.
4. Circuits are properly connected in accordance with the applicable wiring diagrams.
5. Circuits are operable.

E. Immediately repair defects and retest until systems are operating correctly.

F. Submit test reports.

### 3.4 OPERATING INSTRUCTIONS

- A. Furnish the necessary technicians, skilled workers, and helpers to operate the electronic safety and security systems and equipment of the entire project for one 8-hour day.
- B. Where specified in technical sections, provide longer periods required for specialized equipment.
- C. Instruct the Government's designated personnel in operation, and adjustment of systems and equipment.
- D. The Operating and Maintenance Manual shall be available at the time of the instructions for use by instructors and Government personnel.
- E. Schedule the general and specialized instruction periods for a time agreed upon by the COR.

END OF SECTION 28 0500

## SECTION 28 3100 - FIRE DETECTION AND ALARM SYSTEMS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Provide a complete fire detection and alarm system of the noncoded, addressable, analog type, with manual stations, detectors, notification appliances, controls, and devices.
- B. Costs of certification and testing, including tests required by NFPA 72, shall be included in the contract sum.

#### 1.2 DEFINITIONS

- A. FACP: Fire alarm control panel.
- B. HVAC: Heating, ventilation, and air-conditioning.
- C. LED: Light-emitting diode.
- D. SPDT: Single pole, double throw.
- E. Definitions in NFPA 72 apply to fire alarm terms used in this section.

#### 1.3 SYSTEM DESCRIPTION

- A. Control of system: By the FACP.
- B. System supervision: Automatically detect and report open circuits, shorts, and grounds of wiring for initiating device, signaling line, and notification-appliance circuits.
- C. Priority of signals: Automatic alarm response functions resulting from an alarm signal from one zone or device are not altered by subsequent alarm, supervisory, or trouble signals. An alarm signal is the highest priority. Supervisory and trouble signals have second- and third-level priority. Higher-priority signals take precedence over signals of lower priority, even when the lower-priority condition occurs first. Annunciate and display all alarm, supervisory, and trouble signals regardless of priority or order received.
- D. Noninterference: A signal on one zone shall not prevent the receipt of signals from other zones.
- E. System reset: All zones are manually resettable from the FACP after initiating devices are restored to normal.
- F. Transmission to remote alarm receiving station.
- G. System alarm capability during circuit fault conditions: System wiring and circuit arrangement prevent alarm capability reduction when a single ground occurs in an initiating device circuit, signal line circuit, or notification-appliance circuit.
- H. Loss of primary power at the FACP initiates a trouble signal at the FACP. The FACP indicates when the fire alarm system is operating on the secondary power supply.

- I. Basic alarm performance requirements: Unless otherwise indicated, operation of a manual station, automatic alarm operation of a smoke or heat detector, or operation of sprinkler flow switch, initiates the following:
  - 1. Notification-appliance operation.
  - 2. Identification at the FACP and the remote annunciator of the zone and device originating the alarm.
  - 3. Release of fire and smoke doors held open by magnetic door holders.
  - 4. Recording of the event in the system memory.
  - 5. Initiate the transmission of alarm to the Government's remote alarm receiving station.
- J. Alarm silencing, system reset and indication: Controlled by switches in the FACP and the remote annunciator.
  - 1. Silencing-switch operation halts alarm operation of notification appliances and activates an "alarm silence" light. Display of identity of the alarm zone or device is retained.
  - 2. Subsequent alarm signals from other devices or zones reactivate notification appliances until silencing switch is operated again.
  - 3. When alarm-initiating devices return to normal and system reset switch is operated, notification appliances operate again until alarm silence switch is reset. System reset shall be controlled only at the FACP.
- K. Remote detector sensitivity adjustment: Manipulation of controls at the FACP causes the selection of specific addressable, analog smoke detectors for adjustment, display of their current status and sensitivity settings, and control of changes in those settings. Same controls can be used to program repetitive, scheduled, automated changes in sensitivity of specific detectors. Sensitivity adjustments and sensitivity-adjustment schedule changes are recorded in system memory.
- L. Removal of an alarm-initiating device or a notification appliance initiates the following:
  - 1. Transmission of trouble signal to remote alarm receiving station.
- M. FACP alphanumeric display: Plain-English-language descriptions of alarm, supervisory, and trouble events; and addresses and locations of alarm-initiating or supervisory devices originating the report. Display monitoring actions, system and component status, system commands, programming information, and data from the system's historical memory.

#### 1.4 SUBMITTALS

- A. General:
  - 1. When approved, no variation will be permitted except with the approval of the COR.
  - 2. Submit to the authority having jurisdiction and to the Government for review and approval.
- B. Shop drawings:
  - 1. Floor plans indicating final equipment and device locations and raceway routes.
  - 2. System operation description: Detailed description for this project, including method of operation and supervision of each type of circuit and sequence of operations for manually and automatically initiated system inputs and outputs. Manufacturer's standard descriptions for generic systems are not acceptable.
  - 3. Wiring diagrams and riser diagrams.

- C. Product data: Schedule and each type of system component, including dimensioned plans and elevations showing minimum clearances and installed features and devices. Include UL listings.
- D. Battery calculations.
- E. Provide a complete project record drawing as specified in Division 01 and Section 28 0101 showing the location of all the outlets, cable taps, cable routes, and other components installed. Drawings shall be made part of Operating and Maintenance Manuals.
- F. Certifications:
  - 1. UL Certificate of Compliance of system supplier as specified in "Quality Assurance" below.
  - 2. Fire and smoke detection system inspection and test report, completed by the factory representative, endorsed by the Government and the factory representative, including test data, detector locations and serial numbers, a summary of maintenance performed, recommendations for relocation or addition of detectors and final action regarding these recommendations, and system certification.

#### 1.5 QUALITY ASSURANCE

- A. System and equipment shall be UL listed. Each major component shall bear the manufacturer's name and catalog number.
- B. UL labels and local testing (if required): As specified in Section 28 0500, Common Work Results for Electronic Safety and Security.
- C. Single-source responsibility: Obtain system components from a single source who assumes responsibility for their compatibility.
- D. Qualifications of system supplier and installer:
  - 1. Staff shall consist of at least one NICET Level II Technician or a professional engineer registered in Washington DC.
  - 2. Has installed at least ten systems of the type specified which have performed satisfactorily for not less than two years.
  - 3. Maintains a facility with a sufficient stock of spare parts.
  - 4. Shall respond within 24 hours of notification to correct system failure or malfunction. During the project correction period defined in General Conditions and in Section 28 0500, perform such corrections at no addition to the Contract Sum.
- E. Factory-authorized service representative: Trained and certified by the manufacturer of the system, and experienced in the installation and operation of the type of system included in the work.
- F. Comply with NFPA 72, applicable local codes, and regulations and requirements of the authorities having jurisdiction. District of Columbia is the local code authority.

#### 1.6 SEQUENCING AND SCHEDULING

- A. Existing fire alarm equipment: Maintain fully operational until new equipment has been tested and accepted.

1. Field verify existing system is fully operational before beginning work on the existing components. If existing system is not fully operational immediately notify the COR in writing, and do not perform any work on the existing system until directed by the COR.
2. As new equipment is installed, label it NOT IN SERVICE until new equipment is accepted. As equipment is put in service, remove label and label existing equipment NOT IN SERVICE until it is physically removed.

B. Disconnected equipment: Remove equipment and restore damaged surfaces.

1. Operational disconnected equipment: Package, label, and deliver to the Government.

## 1.7 INSPECTIONS AND SERVICE CONTRACT

A. During the general project correction period, every six months starting six months after Substantial Completion, the supplier shall inspect and test the system.

1. Submit written reports to the COR, describing test results, including defects found and how they have been corrected, and listing components replaced.

B. At the end of the correction period, offer the Government a service contract for the complete system.

## PART 2 - PRODUCTS

### 2.1 AVAILABLE MANUFACTURERS

A. Basis-of-design system: Subject to compliance with requirements, provide Simplex Grinnell.

### 2.2 MANUAL PULL STATIONS

A. Description: Fabricated of metal or plastic, and finished in red with molded, raised-letter operating instructions of contrasting color.

1. Single-action mechanism initiates an alarm.
2. Station reset: Key or wrench operated; double pole, double throw; switch rated for the voltage and current at which it operates.
3. Integral addressable module: Arranged to communicate manual-station status (normal, alarm, or trouble) to the FACP.
4. False alarm protector: Tamperproof clear polycarbonate shield in a frame that fits over the pull station. When the shield is lifted to gain access to the pull station, a warning horn shall sound. Include 9-V dc alkaline battery.

### 2.3 NOTIFICATION APPLIANCES

A. Description: Equipped for mounting as indicated and have screw terminals for system connections.

1. Combination devices: Factory-integrated audible and visible devices in a single-mounting assembly.

B. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Horns produce a sound-pressure level of 90 dB, measured 10 feet (3 m) from the horn.

- C. Visible alarm devices: Synchronized xenon strobe lights listed under UL 1971 with clear or nominal white polycarbonate lens. Mount lens on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- (25-mm-) high letters on a removable sleeve on the lens.
  - 1. Rated light output: Indicated on drawings for each location.
  - 2. Strobe leads: Factory connected to screw terminals.
- D. Speakers:
  - 1. UL 1480 listed.
  - 2. Sound output: Minimum of 84 dBA at 10 feet when tapped at 0.5 watt, and maximum of 87 dBA at 10 feet. Taps shall be available at 0.25, 0.5, 1, and 2 watts.
  - 3. 25 or 70.7 V rms.
  - 4. Mounting: Flush or surface-mountable; bidirectional as indicated, with sealed back.
  - 5. Operation: From standard signaling circuits or addressable single- or multizone I/O modules.
- E. Combination speaker/strobe units: Speaker and visible alarm device as specified above, mounted in a fire-retardant, high-impact, white polycarbonate housing suitable for flush or surface mounting.
  - 1. Speaker: Tapped at 0.5 watts; 25 V rms.

#### 2.4 ADDRESSABLE INTERFACE DEVICE

- A. Monitor module: Microelectronic monitor module listed for use in providing a system address for external alarm-initiating devices with normally open contacts.
  - 1. Dual circuit, intelligent, signaling circuit interface module.
- B. Control module: Microelectronic control relay module listed for use in providing control to external appliances or equipment shutdown.
  - 1. One Form C (SPDT) dry relay contact rated at 2 amps and 24 volts DC.
- C. Isolator module: Microelectronic fault isolator module listed for isolating and removing a fault from a data circuit while allowing the remaining data loop to continue operating.
  - 1. Protect loop system against wire-to-wire short circuits by isolating section of loop and permitting other loop sections to continue to operate.

#### 2.5 WIRE AND WIRING SYSTEM

- A. Non-power-limited circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.
  - 1. Low-voltage circuits: No. 16 AWG, minimum.
  - 2. Line-voltage circuits: No. 12 AWG, minimum.
- B. Power-limited circuits: NFPA 70, Types FPL, FPLR, or FPLP, as recommended by manufacturer.
- C. Wiring system: Class B in accordance with NFPA 72.
- D. Type MC fire alarm cable: Equal to AFC Cable Systems FPLP metal-clad, multi-conductor, fire alarm and control cable.

1. Ratings:
    - a. Plenum rated.
    - b. Approved for use as fixed wiring concealed in building.
    - c. Maximum operating temperatures:
      - (1) 105 degrees C dry for FPLP applications at nominal voltage ratings 300 V and less.
      - (2) 90 degrees C dry for MC cable installations at nominal voltage ratings of 600 V and less.
    - d. UL listed for penetrations of wall and floor assemblies of gypsum wallboard, concrete, and concrete masonry with one-, 2-, and 3-hour fire ratings.
  2. Shield over conductor assembly: Laminated aluminum and mylar tape and tinned copper drain wire.
    - a. Drain wire: Minimum No. 18 AWG, in contact with aluminum shield.
  3. Listed in accordance with UL 1596:
    - a. Insulated or bare grounding conductor in accordance with Table 6.3, cabled with the circuit conductors and identified in compliance with Section 35.
    - b. Galvanized steel armor, red, applied over inner cable assembly with positive interlock conforming to the requirements of Section 12.
    - c. Tested in accordance with applicable requirements.
- E. Survivability: Circuits necessary for the operation of notification appliances shall be protected by a 2-hour fire-rated cable, a 2-hour fire-rated cable system, or a 2-hour fire-rated enclosure.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Factory-authorized service representative, as required in "Quality Assurance" in Part 1 above, shall supervise installation, software documentation, adjustment, preliminary testing, final testing, and certification of the system, and provide the operating instructions.
- B. Provide wiring, conduit, and outlet boxes required for the complete system, in accordance with system manufacturer's instructions and with requirements specified in Division 26 for wiring, conduit, and boxes. Provide 12 inches of slack at each outlet.
  1. Install all wiring in conduit.
  2. Install Type MC fire alarm cable in accordance with Article 330 of the National Electric Code (NFPA 70).
  3. Identification: Paint fire alarm junction box covers red.
- C. Wires, cables, conduits, and wiring connections are specified in Division 26, Electrical. Include in the work of this section, wiring, conduits, and equipment connections complying with the requirements of Division 26, so that the fire alarm system will function as specified and indicated on the drawings.
- D. Wiring: Free from grounds or crosses between conductors.



1. Identification: Color code wiring, not duplicating building wiring colors. Tag each wire at each junction point.
  - E. Final connections between equipment and the wiring system shall be made under the direction and supervision of the qualified supplier.
  - F. Provide 20 percent spare capacity for each notification appliance circuit.
- 3.2 INSTALLATION, FIRE ALARM NOTIFICATION BOOSTER
- A. Provide number of notification power supply boosters required for a complete fire alarm system.
  - B. Utilize spare single-pole, 20-ampere circuit breaker in a 120-volt emergency electrical panelboard to make electrical connection to each power supply booster.
    1. Circuit breakers shall match and shall be compatible with the other breakers in the panelboard.
  - C. Branch circuits from panelboards to each notification power supply booster: Two No. 10 wires and one No. 10 ground in conduit no less than 0.75 inch (21-mm) trade size.
  - D. Install conduits and wiring as specified in Sections 26 0519 and 26 0533.
  - E. Provide smoke detector above each power supply booster.
- 3.3 LOCATIONS OF FIRE ALARM EQUIPMENT
- A. Locate the control panel, annunciator, and other associated equipment as shown on the drawings.
  - B. Visual indicating appliances: Install where shown on the drawings. If field conditions require variation from drawings, do not violate ADA requirements, including, but not limited to, the following:
    1. Any room or space required to have a visual appliance, including corridors or hallways: No place shall be more than 50 feet from the indicating appliance in the horizontal plane.
    2. Rooms and spaces exceeding 100 feet in one dimension, without obstructions 6 feet above the finished floor: Indicating appliances may be placed around the perimeter, spaced approximately 100 feet apart.
  - C. Mount indicating and test station for concealed smoke detectors near ceiling under detector. Text engraved on plate shall be descriptive of the device identified.
- 3.4 INSPECTION, TEST, ADJUSTMENT AND REPORT
- A. Furnish equipment and appliances for testing the complete system during progress of the work and after completion of the installation, including a megger test of wiring. The tests generally shall demonstrate the following:
    1. Circuits are continuous and free from short circuits.
    2. Circuits are free from unspecified grounds.
    3. Resistance to ground of non-grounded circuits is not less than one megohm.
    4. Circuits are properly connected in accordance with the applicable wiring diagrams.
    5. Each detector operates correctly.
    6. Detectors are correctly located and sufficient in number.

B. Defects or omissions observed during general and system tests shall be repaired as quickly as possible and the tests reconducted.

C. Submit report as required in Part 1 above.

### 3.5 OPERATING INSTRUCTIONS

A. As specified in Section 28 0500, provide operating instructions.

B. Provide at least 8 hours of additional instruction time for the systems and equipment specified in this section, consisting of 2 periods of 4 consecutive hours, during a period of not more than 60 days.

END OF SECTION 28 3100