

# PROJECT MANUAL

**Barnett Center, Locker Room Remodel  
Northern State University  
Aberdeen, SD  
OSE# R0124--16X**

**Prepared By**

**BUREAU OF ADMINISTRATION  
OFFICE OF THE STATE ENGINEER**

**Joe Foss Building  
523 East Capitol  
Pierre, South Dakota 57501-3182  
605-773-3466  
STACY WATTERS, P.E.  
STATE ENGINEER**



This Project Manual provides for liquidated delay damages in the amount of **\$550.00 per calendar day after the Substantial Completion date of 11/28/25** for the Contractor's delay in completion of the work.  
See the Bid Form and Article 10 of the General Conditions for details.

**02/03/25**

**INDEX**  
**FOR**  
**STATE SPECIFICATION**  
**HEAD SECTIONS, GENERAL CONDITIONS,**  
**SPECIAL CONDITIONS, TECHNICAL SPECIFICATIONS**  
**AND PLANS**

- 1 INDEX
- 2 INVITATION TO BID
- 3 BIDDER'S CHECKLIST
- 4 ASBESTOS CONTAINING MATERIALS STATEMENT
- 5 INSTRUCTIONS TO BIDDERS
  - A..... BID FORM AND/OR EXPLANATION OF UNIT PRICES & ALTERNATES
  - B..... ELECTRONIC BIDDING INSTRUCTIONS
  - C..... BID BOND
  - D..... PERFORMANCE & PAYMENT BOND WITH ACKNOWLEDGMENT OF SURETY
  - E ..... NON-RESIDENT BIDDER AFFIDAVIT
  - F ..... CONTRACTOR'S STATEMENT OF SKILLS & CAPABILITIES
  - G ..... RESIDENT SUBCONTRACTOR CERTIFICATION
- 6 AGREEMENT FOR CONSTRUCTION
- 7 GENERAL INDEX AND GENERAL CONDITIONS
- 8 TECHNICAL INDEX AND TECHNICAL SPECIFICATIONS
- 9 PLAN INDEX AND PLANS

## **INVITATION TO BID**

## Invitation to Bid

Electronic bids will be accepted by the State Engineer on behalf of the South Dakota Board of Regents at [https://www.sd.gov/cs?id=sc\\_cat\\_item&sys\\_id=934563e8971fd6106c7db631f053afe1](https://www.sd.gov/cs?id=sc_cat_item&sys_id=934563e8971fd6106c7db631f053afe1) until March 4, 2025 at 2:00 PM CT for the Barnett Center, Locker Room Remodel, Northern State University, Aberdeen, South Dakota, OSE# R0124--16X.

There will be an on-site pre-bid meeting on February 18, 2025 at 11:00 AM CT. All bidders can meet at Physical Plant building conference room (2nd floor). This pre-bid meeting is optional but is the bidders only opportunity to review the site. Campus contact is Monte Mehlhoff, 605.626.7779, [monte.mehlhoff@northern.edu](mailto:monte.mehlhoff@northern.edu). OSE contact is Steven Palmer, [steven.palmer@state.sd.us](mailto:steven.palmer@state.sd.us).

Copies of the Plans and Specifications may be obtained by bidders at the office of COOP Architecture, 1108 S Main Street Suite 102, Aberdeen, SD 57401. A/E Contact: Steven Savonen, 605.725.4852, [steven@co-oparch.com](mailto:steven@co-oparch.com). Anyone requesting, reviewing, or copying Plans and Specifications for this project agrees that they are doing so for the sole purpose of submitting a bid on the project. Bidder further agrees the Plans and Specifications are the sole property of the State;

Each bid in excess of \$100,000.00 must either pre-mail a certified check, cashier's check, or draft in the amount of 5% of the base bid and all add alternates and drawn on a State or National Bank to the Office of the State Engineer, Joe Foss Building, 523 East Capitol Ave, Pierre, SD 57501-3182, or upload a copy of their 10% bid bond to their electronic bid issued by a surety authorized to do business in the State of South Dakota and made payable to the Board of Regents of the State of South Dakota. The BOR reserves the right to reject any or all bids and to waive any irregularities therein. All active bids can be found here: <https://boa.sd.gov/state-engineer/adv-advertisements.aspx>

**Office of the State Engineer**

Published twice at the total approximate cost of \_\_\_\_\_.

## BIDDER'S CHECKLIST

The following items need to be submitted along with your bid, via the electronic bidding platform. All bids and any modifications to bids must be in the hands of the State Engineer or the State Engineer's representative, via the electronic bidding platform, on or before the time set for opening bids in the Invitation for Bids.

- All blanks on the electronic Bid Form are filled in.
- Receipt of all addenda is noted on the electronic Bid Form.
- Bid Form is electronically signed by an officer of the corporation or, if not a corporation, a proprietor or partner.
- For bids of \$100,000.00 or higher, a copy of the bid bond or security is submitted with the electronic bid and is mailed to the Office of the State Engineer.
- If a foreign contractor, a fully executed "Non-Resident Bidder Affidavit" is submitted with the bid.

## **ASBESTOS STATEMENT**

#### ASBESTOS CONTAINING MATERIALS CAUTION:

It is brought to the contractor's attention that asbestos containing materials (greater than 1%) may be present outside the project requirements yet within the building or area. The contractor shall take the necessary precautions so as not to disturb this material. If asbestos containing materials are disturbed, the contractor shall follow and comply with the state rules promulgated under SDCL 34-44 pertaining to asbestos, and 29 CFR 1926.58, 40 CFR Part 61, 40 CFR Part 763 as in effect and the United States Environmental Protection Agency publication entitled "Guidance for Controlling Asbestos Containing Materials in Buildings" (EPA 560/5-85-024, June 1985).

#### ASBESTOS CONTAINING MATERIALS STATEMENT:

In accordance with the provisions of SDCL 34-44-8, all bidders and contractors are hereby notified that to the best knowledge of the owner or those representing him in any capacity, this project **does not** involve asbestos containing materials (greater than 1%). Bidders are further instructed that no asbestos containing materials are to be installed in this project.

The contractor is cautioned that hidden materials unknown to the owner and inaccessible for testing may be found during the demolition work of this project which may be asbestos containing materials. Proper procedures shall be followed upon discovery of these materials. The owner or those representing the owner in any capacity shall not be held responsible or liable for any injury or cost to any person resulting from handling of or proximity to such materials.

#### ASBESTOS LIABILITY STATEMENT

In accordance with amended SDCL 34-44, neither the owner, employees, or agents of the owner, nor any other person may have any claim, right or action against the prime contractor for any asbestos related injury or damage arising from the activities of a certified asbestos abatement subcontractor. Unless exempt under applicable state and federal law, no asbestos abatement work may be performed except by a certified asbestos contractor. A certified asbestos abatement subcontractor shall hold the owner and general contractor harmless from any liability arising from such subcontractor's activities on the project. A certified asbestos abatement contractor shall cause the owner and, if acting as a subcontractor, the general contractor to be named as additional insureds and provide sufficient proof of insurance for purposes of this section.

## **INSTRUCTIONS TO BIDDERS**



## **Instructions to Bidders**

### **1. Examination of Plans, Specifications and Site.**

Bidders should carefully examine the site of the proposed work, subsurface conditions, the Plans and Specifications, and the bid and contract documents governing the project. The submission of bids is conclusive evidence that the bidder has investigated and is satisfied as to the conditions to be encountered; the character, quality, and scope of the proposed work; the quality and quantity of the materials to be furnished; and the requirements of the bid, the Plans and Specifications, and the other Contract Documents.

The Plans and Specifications are to be used only with respect to this project and are not to be used for any other project or purposes other than preparing a bid for this project; the Plans and Specifications will not be disseminated to any person or entity for purposes other than obtaining pricing information without the express written approval of the state; all information contained in the Plans and Specifications is confidential; and should the bidder disseminate the Plans and Specifications to an individual or entity for purposes of obtaining pricing information, the bidder will require that individual or entity to adhere to the terms set forth herein. The bidder, however, assumes no liability for the misuse of the Plans and Specifications by such third party or such third party's failure to comply with the provisions contained herein.

Any copies of the Plans and Specifications obtained directly from the State will be returned to the office of the Architect/Engineer immediately after the State provides notice that bidder will not be awarded a contract, or thirty (30) days after the bid opening for the project, whichever occurs first. Any copies of the Plans and Specifications made by the bidder will be destroyed immediately after the State provides notice that bidder will not be awarded a contract, or thirty (30) days after the bid opening for the project, whichever occurs first. If bidder does not submit a bid, bidder will fulfill the requirements previously outlined on or before the date of the bid opening. Should bidder be awarded a contract for construction of the project, bidder does not need to return or destroy Plans and Specifications until after completion of the project.

### **2. Submission of Bids.**

Each bid must:

- a. Be submitted via the electronic bidding platform;
- b. Include any addenda issued during the time of advertising for bids the same as though it had been included in the original Plans and Specifications; and

All bids and any modifications to bids must be in the hands of the State Engineer or the State Engineer's representative, via the electronic bidding platform, on or before the time set for opening bids in the Invitation for Bids. Bids will not be received after the time for bid opening.

### **3. Modification of Bids.**

- a. Bids may be modified, via the electronic bidding platform, at any time, not later than the time set for the opening of bids. No bid made shall be changed or altered by telephone. No oral changes, alterations or conditions will be accepted under any circumstance.

#### **4. Contractor's Qualification Statement.**

For bids of \$100,000.00 or more, the low bidder, upon request, must submit to the Office of the State Engineer, within 48 hours of said request, Contractor's Statement of Skills and Capabilities (Exhibit "F") with their bids. The Contractor's Qualification Statement (AIA Document A305) or the AGC's Contractor Qualification Statement may be used provided it includes all the information required by the OSE document, minus the financial statement.

#### **5. Bid Security.**

Each bid over \$100,000.00 must be accompanied by a bid security as follows:

- a. Certified Check, Cashier's Check or Draft. A certified check, cashier's check or draft for five percent (5%) of the amount of the bid, including all add alternates, such check to be certified or issued by either a State or National Bank and payable to said public corporation or officer. A certified check, cashier's check or draft shall be received at the Office of the State Engineer no later than the date and time of the bid opening.
- b. Bid Bond. In lieu of a certified check as a bid guarantee, a bid bond of ten percent (10%) of the total amount of the bid, including all add alternates, may be furnished by the Contractor. See Exhibit "C" for Bid Bond form. Such bond to be issued by a surety authorized to do business in the State of South Dakota. Such bond shall be payable to said public corporation or officer as guaranty that such bidder will enter into a contract with said public corporation, its Board or officers thereof, in accordance with the terms of such letting and bid in case such bidder be awarded the contract. A copy of the bid bond shall be attached to the bid, via the electronic bidding platform.

No bidder shall be required to leave his/her certified check or other guaranty or bid bond posted for a longer period than thirty (30) days if the bid is not accepted. The certified check or other guaranty of the successful bidder shall be returned to him forthwith upon the execution of the contract and surety herein provided for.

#### **6. Withdrawal of Bids.**

Any bid may be withdrawn, via the electronic bidding platform, at any time before the time specified in the advertisement therefor. Withdrawal of a bid does not prejudice a bidder's right to submit a new bid within the time designated for the submission of bids. No bids may be withdrawn after the time designated in the Invitation to Bid for the opening of bids.

#### **7. Request for Interpretation.**

Any person who plans to bid on the project may submit to the Owner a written request for an interpretation of any part of the Plans and Specifications or Contract Documents. Requests for interpretations shall be made not less than ten (10) days prior to the opening of bids. Any interpretation will be in writing and furnished to each person receiving Plans and Specifications for bidding. The Owner will not be responsible for any other explanation or interpretation.

**8. Or Equal Clause.**

Whenever a material, article, or piece of equipment is identified on the Plans or in the Specifications by reference to manufacturers' or vendors' names, trade names, catalogue numbers, etc., it is intended merely to establish a standard; and any materials, article, or equipment of other manufacturers and vendors which will perform adequately the duties imposed by the general design will be considered equally acceptable provided the requirements of Article 6.3.4 of the General Conditions are met and the material, article, or equipment so proposed is, in the opinion of the Architect and State Engineer, of equal substance and functions.

**9. Preference for South Dakota Products, Labor and Materials.**

By virtue of statutory authority in SDCL § 5-18A-6(10) et seq. preference will be given to South Dakota products, labor and materials as provided by law.

**10. Opening of Bids.**

Bids will be received until the time for opening designated in the Invitation to Bid. All bids received within the designated time will be opened and read aloud at the time and place designated in the Invitation to Bid. Bidders and their authorized agents are invited to attend in person or online.

**11. Relief from Mistake in Bid.**

A bidder claiming a mistake in a bid must give the State written notice of the alleged mistake within five calendar days after the bids are opened, specifying in detail how the mistake occurred. Relief will only be granted for clerical or mathematical mistakes which can be documented to the satisfaction of the State Engineer.

**12. Consideration of Bids.**

At the time of opening bids, the State will verify ~~the bidder is prequalified for the specified work type and the bidder's bidding capacity at that time is sufficient to handle the work for which the bidder submitted a bid proposal.~~ The State reserves the right to refuse to accept a bid for any of the following reasons:

- ~~a. Lack of competency or adequate machinery, plant, or other equipment, as shown by the Contractor's Prequalification Statement;~~
- b. Uncompleted work which the State determines, in its sole discretion, may hinder or prevent the prompt completion of additional work;
- c. Failure to pay or satisfactorily settle any legal obligation due for labor or material on any contract at the time of issuance of bid;
- ~~d. Failure to comply with the State's prequalification regulations;~~
- e. Default under any previous contract or contracts;
- f. Debarment by the State or the federal government;
- g. Disqualification by the State. The following reasons will be considered sufficient for disqualifying a bidder and rejecting the bid or bid proposals:
  - 1. Submittal of more than one bid for the same work from an individual, firm, or corporation under the same or different name; or,

2. Evidence of collusion among bidders. A participant in collusion will not receive recognition as a bidder for future work with the State until reinstated as a qualified bidder;
- ~~h. Lack of overall bidding capacity as established by the Contractor's prequalification statement, considering the uncompleted work currently under contract;~~
- ~~i. Lack of per contract bidding capacity as established by the Contractor's prequalification statement; or~~
- j. Unsatisfactory performance on previous work or any current contract or contracts consisting of, but not limited to:
  1. Noncompliance with contract specifications, contract requirements, or Engineer's directives;
  2. Failure to complete work on time;
  3. Instances of substantial corrective work prior to acceptance;
  4. Instances of completed work that requires acceptance at reduced pay;
  5. Production of work or materials not meeting required specifications, and when applicable, requiring price reductions or corrective work;
  6. Failure to provide adequate safety measures or appropriate traffic control that endangers the safety of the work force and public;
  7. Questionable moral integrity as determined by the Attorney General of the State, or the State; or,
  8. Failure to reimburse the State for monies owed on any previously awarded contract including any contract where the prospective bidder is a party to a joint venture and the joint venture has failed to reimburse the State for monies owed.

After opening, the State will compare the bids on the basis of the summation of the products of the quantities shown in the bid by the lump sum, and/or alternates, and/or unit bid prices. The State will make results of such comparisons available to the public. In the event of a discrepancy between unit bid prices and extensions, the unit bid price will govern.

The State reserves the right to reject any bid(s), the right to waive technicalities, and the right to reject all bids and advertise for new bids, if in the sole judgment of the State the rejection or waiver will promote the best interest of the State.

### **13. Rejection of Bids.**

Bids may be rejected if they show any alteration of form, additions not called for, conditional bids, incomplete bids, unexplained erasures, or irregularities of any kind. The State may waive any informality in the bids received. When bids are signed by an agent other than an authorized corporate officer or member of a partnership, a power of attorney must be filed with the bid. Otherwise, the bid will be rejected as irregular and unauthorized. If there is reason to believe that collusion among the bidders exists, any or all bids may be rejected. The State reserves the right to reject all bids if in the judgment of the State Engineer it is in the best interest of the State.

**14. Award of Contract.**

If the contract is awarded, it will be awarded to the responsible bidder submitting the lowest bid, subject to paragraph 18 below, which complies with the Invitation to Bid and with these instructions. The successful bidder will be notified within thirty (30) calendar days of the date bids are opened. Subsequent to notice of award, the successful bidder will be presented with a contract agreement. The contract will require the completion of work according to the Plans and Specifications and the Contract Documents. Conditional bids will not be accepted.

**15. Responsibility.**

The Owner may make such investigations as he/she deems necessary to determine the ability of the bidder to perform the work, and the bidder shall furnish to the Owner all such information and data for this purpose as the Owner may request. The Owner reserves the right to reject any bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the Owner that such bidder is properly qualified to carry out the obligations of the contract and to complete the work contemplated therein.

**16. Nonresident Bids.**

SDCL § 5-18A-26, provides that the Contract shall be let to the lowest responsible bidder; provided, however, a resident bidder may be allowed a preference on any such contract as against the bid of any bidder from any other State or foreign province which enforces or has a preference for resident bidders. The amount of the preference given to the resident bidder shall be equal to the preference in the other state.

**17. Subcontractor Certification.**

SDCL§ 5-18B-6, provides that prior to execution of a public improvement project a successful bidder shall certify on the prescribed form (Exhibit "G"):

- (1) That no more than twenty-percent of the cost of labor included in the contract is being provided by nonresident subcontractors; or
- (2) That more than twenty percent of the cost of labor included in the contract is being provided by nonresident subcontractors because resident contractors are not available and at competitive prices.

**18. Method of Award.**

- a. Bidding procedure involving only a base bid: If the base bid is within the amount of funds available to finance the construction contract, then contract award will be made to that responsible bidder submitting the low base bid. If the low bid exceeds the funds available to finance the construction, the State may negotiate with the low bidder to produce a bid amount within the availability of funds.
- b. Bidding procedure involving a base bid and alternate bids: If the base bid is within the amount of funds available to finance the construction contract and the Owner wishes to accept alternate bids, then contract award will be made to that responsible bidder submitting the low combined bid, consisting of the base bid and any combination of add or deduct alternative bids found to be most advantageous to the Owner. Under this procedure, if the Owner wishes to make award on low base bid only, then contract award will be made to that responsible bidder submitting the low base bid. If the low bid exceeds the funds available to finance the construction, the State may negotiate with the low bidder to produce a bid amount within the availability of funds.

**19. Execution of Agreement.**

Within ten (10) calendar days after the proposed contract agreement is presented to the successful bidder for execution, the successful bidder must execute the contract documents and, *if the Contract is for more than \$100,000.00*, provide a performance and labor and material payment bond.

**20. Performance & Labor and Material Payment Bond.**

If the Contract is for more than \$100,000.00, provide a performance and labor and material payment bond produced by a South Dakota licensed insurance producer (agent) and issued by a South Dakota licensed surety in an amount not less than the amount of the awarded contract. The performance and labor and material payment bond Surety or Sureties shall meet all requirements of South Dakota Law.

This bond is to secure the faithful performance of the contract and the payment of those to whom the bidder may become legally indebted for labor, materials, tools, equipment, or services of any kind used or employed by the bidder in performing the work. The surety bond shall be on the form attached hereto as Exhibit "D". *(Failure on the part of the bidder to furnish such bond in the time stated shall be cause for consideration by the State of awarding the Contract to the second low bidder and the retention of the bid deposit.)*

**21. Power of Attorney.**

Attorneys-in-fact who sign bid bonds or contract bonds must file with each bond a certified and effectively dated copy of their power of attorney.

**22. Default.**

The failure to execute the contract documents or to furnish bonds required by these instructions within ten (10) calendar days after the proposed contract agreement is presented for execution constitutes a default. In the event of a default, the State may award the contract to the next lowest bidder or may re-advertise for bids. The State may charge against the defaulting bidder the difference between the amount of the bid and the amount for which a contract for the work is subsequently executed plus the State's additional administrative cost necessitated by the bidder's failure to execute the Contract Documents, irrespective of whether the amount thus due exceeds the amount of the bid bond. If a more favorable bid is received by re-advertising, the defaulting bidder shall have no claim against the State for a refund.

**23. Commencement of Work/Time of Completion.**

The contractor for the general construction shall commence work under the contract within ten (10) consecutive calendar days after issuance of written Notice to Proceed and shall substantially complete all work under the contract within the timeframe specified in the Bid Form.

**24. Liquidated Damages.**

See Article 10.3.4 of the General Conditions.

**25. Applicable Laws and Regulations.**

The bidder's attention is directed to the fact that all applicable South Dakota laws, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the contract throughout and they will be deemed to be included in the contract the same as though herein written out in full.

**26. South Dakota Tax Information for Public Contracts.**

Contractors performing public contracts in South Dakota may become responsible for two types of taxes: the excise tax upon realty improvement contracts and the sales/use tax upon materials.

All contractors must secure a license from the Department of Revenue before engaging in the construction activities in this State. Detailed information on tax requirements may be obtained from the Department of Revenue, Anderson Building, Pierre, South Dakota 57501. Telephone 605.773.3311.

**27. Applicable Standards.**

In addition to codes, Standards and Regulations referenced for compliance in the various sections of the Specifications, the work shall be in compliance with the following:

ANSI Z53.1 - 1971, and as revised  
Safety color code for marking physical hazards.

ANSI A13.1 - 1975, and as revised  
Scheme for the identification of piping systems.

ANSI C2, and as revised  
National Electrical Safety Code.

**28. Affirmative Action Plan.**

The State of South Dakota requires that all contractors, vendors, and suppliers, employing fifty or more persons, doing business with any State Agency, Department, or Institution, place on file a statement of Affirmative Action that said contractor, vendor, or supplier does not discriminate in its employment practices with regard to race, color, religion, sex or national origin.

No award of any contract with the State of South Dakota shall be executed or awarded and approved by the State for any service, supply, or commodity unless the successful bidder submits such statement.

Above statement may be submitted to the State Engineer with the contractor's bid, or prior to award of contract.

**29. Procurement Law.**

This project is subject to the provisions of SDCL § 5-18A and 5-18B et seq.

**EXHIBIT "A"**

**BID FORM**



## BID FORM

All bids shall be submitted via the OSE Electronic Bidding Platform, details below:



# OSE Electronic Bidding

Submit Bid

### Overview

The undersigned, being familiar with the local conditions affecting the work, and with the Contract Documents, including the Invitation to Bid, Instructions to Bidders, Bid Form, Explanation of Alternates, Modification to Bid Form, Bid Bond Form, Performance and Payment Bond, Acknowledgment of Surety, Sample Certification of Surety, Non-Resident Bidder Affidavit, Form of Agreement for Construction, General Conditions, Special Conditions, Technical Specifications, Plans and Addenda which govern the purchase of material and labor and the awarding of contracts hereby proposes to do all the work and provide all the material and equipment for the project.

Bid Opening Date:	<b>03/04/25</b>	
Bid Opening Time:	<b>2:00 PM CT</b>	
Date of Project Manual:	<b>02/03/25</b>	
Date of Plans:	<b>02/03/25</b>	
Substantial Completion Date:	<b>11/28/25</b>	w/ Liquidated Damages: <b>\$550.00</b> per calendar day
Final Completion Date:	<b>12/19/25</b>	w/ Liquidated Damages: <b>\$300.00</b> per calendar day
Total value of material subject to tax:	<b>\$0.00</b>	

*Any material furnished by the State for use in this project is subject to Use Tax and Excise Tax.*

Link to Bidding: [https://www.sd.gov/cs?id=sc\\_cat\\_item&sys\\_id=934563e8971fd6106c7db631f053afe1](https://www.sd.gov/cs?id=sc_cat_item&sys_id=934563e8971fd6106c7db631f053afe1)

#### **ATTENTION BIDDERS!**

- **TECHNICAL DIFFICULTIES:** OSE is not responsible for technical difficulties resulting from the electronic bidding platform.
- **MODIFY BIDS:** It is highly recommended that contractors submit their bid early and modify as needed prior to the bid closing. Please note, bids may be modified as many times as desired prior to the bid opening date/time as well as withdrawn at any point prior to the bid opening.
- **SESSION TIMEOUT:** The online bidding platform session will timeout if left open for too long, therefore bids need to be submitted in a timely manner as to ensure the information is not lost and other errors do not occur.

## **EXPLANATION OF UNIT PRICES & ALTERNATES**

There are no alternates or unit prices.

**EXHIBIT “B”**

**ELECTRONIC BIDDING INSTRUCTIONS**

May 9, 2022

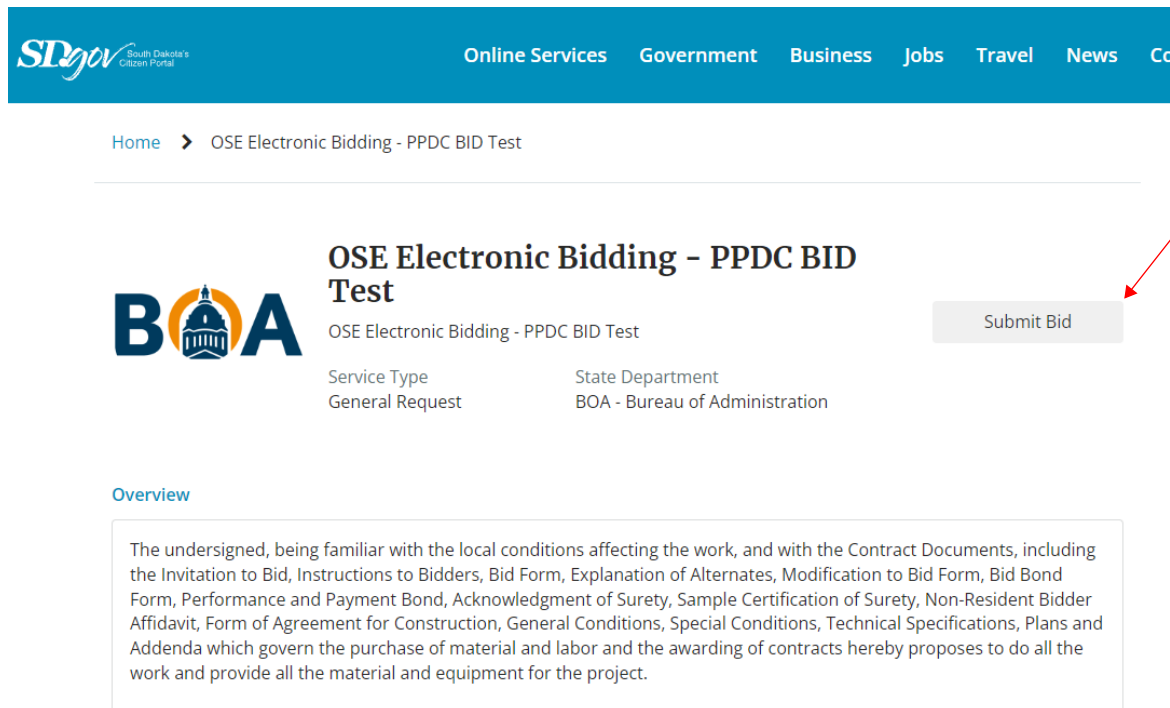
**RE: ELECTRONIC BIDDING**

The State of South Dakota, Office of the State Engineer (OSE), has switched to an electronic bidding platform! Please find below screen shots and information on submitting an electronic bid.

The State of SD has switched to a “single sign on” platform for all State services. Therefore, the username and password you use for purchasing a SD hunting or fishing license would be the same username and password you would use to submit an electronic bid on an OSE project. We just want you to be cognizant of that as you set up your SD.gov account.

Each project will have its own unique web address for bidding. This can be found in the advertisement on our website for that specific project, the builders exchanges advertisements, as well as the newspapers. If you ever cannot find the link, please reach out to OSE at the contact information above and we can assist you.

When you click the link, it will ask you to log on. Once you have logged on, you’ll see the project title and a button to click for “Submit Bid.”



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Home > OSE Electronic Bidding - PPDC BID Test

**OSE Electronic Bidding - PPDC BID Test**

OSE Electronic Bidding - PPDC BID Test

Submit Bid

Service Type: General Request  
State Department: BOA - Bureau of Administration

**Overview**

The undersigned, being familiar with the local conditions affecting the work, and with the Contract Documents, including the Invitation to Bid, Instructions to Bidders, Bid Form, Explanation of Alternates, Modification to Bid Form, Bid Bond Form, Performance and Payment Bond, Acknowledgment of Surety, Sample Certification of Surety, Non-Resident Bidder Affidavit, Form of Agreement for Construction, General Conditions, Special Conditions, Technical Specifications, Plans and Addenda which govern the purchase of material and labor and the awarding of contracts hereby proposes to do all the work and provide all the material and equipment for the project.

Once you click "Submit Bid" you will see the project information populate and the path on top. The Contractor will be prompted to enter their company information.

## OSE Electronic Bidding - PPDC BID Test



\* Indicates required

OSE #:  
ASW22--FUN/PPDC

Project Name:  
PPDC BID Test

Project Location:  
Drifters Bar and Grille

Project Campus:  
Capital Complex

Bid Opening Date  
06/03/2022 10:30:00

The project information will auto populate, including the bid opening date.

The undersigned, being familiar with the local conditions affecting the work, and with the Contract Documents, including the Invitation to Bid, Instructions to Bidders, Bid Form, Explanation of Alternates, Modification to Bid Form, Bid Bond Form, Performance and Payment Bond, Acknowledgment of Surety, Sample Certification of Surety, Non-Resident Bidder Affidavit, Form of Agreement for Construction, General Conditions, Special Conditions, Technical Specifications, Plans and Addenda which govern the purchase of material and labor and the awarding of contracts hereby proposes to do all the work and provide all the material and equipment which pertains to this project.

\* Bidder:  
Name of Firm / Company

\* Name Of Firm's Representative:  
Stacy Watters

\* Title Of Firm's Representative:

\* Phone  
(605) 484-6754


\* Email  
Wattersstacy@gmail.com

\* Firm's Business Address:

\* State of Incorporation:

Required information

**Bidder:** **Title Of Firm's Representative:** **Firm's Business Address:** **State of Incorporation:**

 Add attachments

Next

# OSE Electronic Bidding - PPDC BID Test



\* Indicates required

\* Dollar amount: \$

Review

Please click on the pencil icon in the Actions column below and enter an Alternate bid for each line item.

\* Bid Information

Actions	Alternate	Zero Dollar Change/Add/Deduct from the base bid the sum of:	DOLLARS \$
	Construction funds approved in legislation this FY		

Required information

Dollar amount: \$

Add attachments

Back

Next

Once you click next, it will bring you to the bid form for the project. This will have base bid plus any alternates. The base bid must be filled in with numbers only (no symbols). Once you fill base bid in and click outside of that field, the review tab will auto populate with symbols for you to review.

If your bid is over \$100,000 an additional line will appear asking for a copy of a bid bond. This will only show up, if your bid exceeds that threshold. Please attach a copy (jpg, pdf, or similar) to your bid. If you prefer to mail a certified check, there is also a button you can select that says, "I have mailed a check to OSE, in lieu of a bid bond."

This project has one alternate listed. Click on the pencil to edit the value for the alternate.

**Edit Row** ×

Alternate  
Construction funds approved in legislation this FY

\*Zero Dollar Change/Add/Deduct from the base bid the sum of:

Add ▲

🔍

-- None --

**Add**

Deduct

Zero Dollar Change

Once you click the pencil, it will ask from a drop down menu if you want to add, deduct, or zero dollar change for the alternate. The alternate title will be listed for reference. Once you make your selection, enter your dollar value and click save.

# OSE Electronic Bidding - PPDC BID Test



\*Dollar amount: \$

100001.00

Review

\$100,001.00

\*Only applicable for bid is greater than \$100,000 Uploaded to this proposed bid is a copy of a 10% bid bond, for the base bid and all alternates, issued by a surety authorized to do business in the state of South Dakota, in the amount of

10000.10

Review

\$10,000.10

Please attach a copy of your Bid Bond. At the bottom of the page you will see the "Add Attachment" paperclip icon.

Check this box if you have mailed a certified check or cashier's check in the amount of 5% of the base bid and all add alternates in lieu of a 10% bid bond. Mailing address: Office of the State Engineer, 523 East Capitol Ave, Pierre SD 57501

Please click on the pencil icon in the Actions column below and enter an Alternate bid for each line item.

\*Bid Information

Actions	Alternate	Zero Dollar Change/Add/Deduct from the base bid the sum of	DOLLARS \$
	Construction funds approved in legislation this FY	Add	500,000,000

Add attachments

Back

Next

Alternate Title

This will then bring you to your bid form filled out for your review. Then click "Next."




## OSE Electronic Bidding - PPDC BID Test



No Unit Prices are needed for this project

Review

 Add attachments

Back

Next



If your project has unit prices, they will populate next for you to fill out. You would enter those in the same fashion that you entered your alternate. Click "Next" to proceed.

## OSE Electronic Bidding - PPDC BID Test



This then brings you to your final review page

\* Indicates required

OSE #:

ASW22--FUN/PPDC

Project Name:

PPDC BID Test

Project Location:

Drifters Bar and Grille

Project Campus:

Capital Complex

Bid Opening Date

06/03/2022 10:30:00

The undersigned, being familiar with the local conditions affecting the work, and with the Contract Documents, including the Invitation to Bid, Instructions to Bidders, Bid Form, Explanation of Alternates, Modification to Bid Form, Bid Bond Form, Performance and Payment Bond, Acknowledgment of Surety, Sample Certification of Surety, Non-Resident Bidder Affidavit, Form of Agreement for Construction, General Conditions, Special Conditions, Technical Specifications, Plans and Addenda which govern the purchase of material and labor and the awarding of contracts hereby proposes to do all the work and provide all the material and equipment which pertains to this project.

\* Bidder:

South African Construction

\* Name Of Firm's Representative:

Stacy Watters

\* Title Of Firm's Representative:

Grunt

\* Phone

(605) 484-6754

\* Email

Wattersstacy@gmail.com

\* Firm's Business Address:

523 East Capital Ave. Pierre SD 57501

\* State of Incorporation:

SD

**Review all information!**

\*Dollar amount: \$  
100001.00

Review  
\$100,001.00

\*Only applicable for bid is greater than \$100,000 Uploaded to this proposed bid is a copy of a 10% bid bond, for the base bid and all alternates, issued by a surety authorized to do business in the state of South Dakota, in the amount of  
10000.10

Review  
\$10,000.10

Please attach a copy of your Bid Bond. At the bottom of the page you will see the "Add Attachment" paperclip icon.

Check this box if you have mailed a certified check or cashier's check in the amount of 5% of the base bid and all add alternates in lieu of a 10% bid bond. Mailing address: Office of the State Engineer, 523 East Capitol Ave, Pierre SD 57501

Please click on the pencil icon in the Actions column below and enter an Alternate bid for each line item.

\*Bid Information

Actions	Alternate	Zero Dollar Change/Add/Deduct from the base bid the sum of:	DOLLARS \$
	Construction funds approved in legislation this FY	Add	500,000,000

No Unit Prices are needed for this project

Review

The above bid includes all applicable State and Municipal Sales and Use Taxes on materials, and State and Municipal Excise Taxes and all other State and Federal Taxes that would affect the amount of the bid. (See Instructions to Bidders-SD Sales and Use Tax Information for Public Contracts.)

In addition, any material furnished by the State for use in this project is subject to Use Tax and Excise Tax. The total taxable value of materials furnished by the State for this project is:

0

A Performance and Payment Bond as required by General Conditions will not be required on contracts which do not exceed One Hundred Thousand Dollars (\$100,000). (See SDCL 5-21-1.1 as amended). If discrepancies remain at the time of substantial completion, a value will be assigned to each of the discrepancies and two (2) times their estimated value will be retained from payment to the Contractor until completed and accepted. (See SDCL 5-18-13 as amended).

Within ten (10) days after Contractor's receipt of the Agreement for Construction, the Contractor shall submit to the Office of the State Engineer, the executed Agreement for Construction, Performance and Payment Bond, Certificates of Insurance and Affirmative Action Plan (if applicable).

Work shall be commenced within ten (10) consecutive calendar days after written Notice to Proceed by the State Engineer and shall be substantially completed by:

12/31/2022

The undersigned acknowledges that they have read and understand the Asbestos-Containing Materials Statement contained in the project manual.

**Review all information!**

In submitting this bid, it is understood that the right is reserved by the Owner to reject any and all bids and to waive any irregularities. It is further understood by the Bidder that he may not withdraw their Bid within 30 days after the actual opening thereof.

In submitting this bid, bidder asserts they have reviewed all provisions of the General Conditions including the provision for assessment of liquidated damages found in Article 10 of the General Conditions. Bidder agrees that the damages anticipated by the Owner in the event of delay in completion of the project are uncertain in amount and difficult to prove; the amount stipulated in Article III of the Agreement for Construction is a reasonable amount in light of the anticipated loss and injury; and the Owner's actual damages in the event of delay would be impracticable or extremely difficult to fix. Bidder agrees to be bound by the liquidated damages set forth in Article III of the Agreement for Construction. Bidder further agrees that the liquidated amount stipulated in Article III of the Agreement for Construction is not a penalty.

For contractors, vendors, suppliers, or subcontractors with five (5) or more employees who enter into a contract with the State of South Dakota that involves the expenditure of one hundred thousand dollars (\$100,000) or more, by submitting a response to this solicitation or agreeing to contract with the State, the bidder or offeror certifies and agrees that the following information is correct:

The bidder or offeror, in preparing its response or offer or in considering proposals submitted from qualified, potential vendors, suppliers, and subcontractors, or in the solicitation, selection, or commercial treatment of any vendor, supplier, or subcontractor, has not refused to transact business activities, has not terminated business activities, and has not taken other similar actions intended to limit its commercial relations, related to the subject matter of the bid or offer, with a person or entity on the basis of Israeli national origin, or residence or incorporation in Israel or its territories, with the specific intent to accomplish a boycott or divestment of Israel in a discriminatory manner. It is understood and agreed that, if this certification is false, such false certification will constitute grounds for the State to reject the bid or response submitted by the bidder or offeror on this project and terminate any contract awarded based on the bid or response. The successful bidder or offeror further agrees to provide immediate written notice to the contracting executive branch agency if during the term of the contract it no longer complies with this certification and agrees such noncompliance may be grounds for contract termination.

\*The signer acknowledges that they have read, understand, and agree to the information stated in the Instructions to Bidders


Yes

If you need to withdraw your bid after it's submitted, please click on the "Take Action" tab. You will see a Close Request button there.

Submit

#### Required information

The signer acknowledges that they have read, understand, and agree to the information stated in the Instructions to Bidders

 Add attachments

Back

[Home](#) > [OSE Electronic Bidding - PPDC BID Test](#)

## OSE Electronic Bidding - PPDC BID Test

### Request Confirmation



Thank you for submitting request CS0002377

View Request

Go Home

Once you click submit, you will see this screen. If you click, view request, you can view and/or edit at any time.

Number  
CS0002377

Created just now Updated just now State Bid Received

## OSE Electronic Bidding - PPDC BID Test

Show more

### OSE Electronic Bidding - PPDC BID Test

CS0002377 Bid Received

#### Details

Opened  
06/01/2022 08:51:13

Task type  
Office of the State Engineer

Updated  
06/01/2022 08:51:22

Bid Details Comments Attachments Take Action

#### Variables

OSE #:

ASW22--FUN/PPDC

Number  
CS0002377

Created 1m ago Updated 1m ago State Bid Received

## OSE Electronic Bidding - PPDC BID Test

Show more

### OSE Electronic Bidding - PPDC BID Test

CS0002377 Bid Received

#### Details

Opened  
06/01/2022 08:51:13

Task type  
Office of the State Engineer

Updated  
06/01/2022 08:51:22

Bid Details Comments Attachments Take Action

Type your message here...

Send



S

system  
Electronic Bidding PPDC.pdf  
218.6 KB

1m ago

SW

Stacy Watters  
CS0002377 Created

1m ago

Start

Comments on the project are here. Any addendum's issued would show up in the comments (as well as emailed).

Number  
CS0002377

Created 1m ago Updated 1m ago State **Bid Received**

## OSE Electronic Bidding - PPDC BID Test

Show more ▾

### OSE Electronic Bidding - PPDC BID Test

CS0002377 Bid Received

#### Details

Opened  
06/01/2022 08:51:13

Task type  
Office of the State Engineer

Updated  
06/01/2022 08:51:22

Bid Details Comments **Attachments** Take Action

Any attachments are under the "Attachments Tab"

Electronic Bidding PPDC.pdf (218.6 KB)

1m ago

Number  
CS0002377

Created 2m ago Updated 2m ago State **Bid Received**

## OSE Electronic Bidding - PPDC BID Test

Show more ▾

### OSE Electronic Bidding - PPDC BID Test

CS0002377 Bid Received

#### Details

Opened  
06/01/2022 08:51:13

Task type  
Office of the State Engineer

Updated  
06/01/2022 08:51:22

Bid Details Comments Attachments **Take Action**

Close Request

Click on "Close Request" only if you want to withdraw your bid entirely.

Once you submit your bid, you will receive an email similar to the snapshot below. You will receive similar emails for any addendum's issued.



RE: Electronic Bid received

Location: Drifters Bar and Grille

Campus: Capital Complex

OSE# ASW22--FUN/PPDC

Dear Stacy Watters,

Your bid for the above referenced project has been received and will be opened publicly on the date and time of the advertisement, which is when bidding officially closes for this project. You can modify your bid any time up until the bidding is closed. You will be notified via email if any addendum's are issued that need to be acknowledged. They will also be posted on the website.

We will be opening bids via Zoom on our live channel that can be found at this link: <https://zoom.us/j/3043640283>

**Password: BID**

If you are unable to watch, a bid tab will be posted to the website shortly after the bids have been opened and read. Thank you for your interest in working with the State of South Dakota.

Respectfully,

The Office of the State Engineer

- Make sure the email address you use is checked regularly
- When an addendum is issued, you will be notified via email to log back on and acknowledge the addendum(s)
- For projects over \$100K, there will be a link to attach a copy of your bid bond or an address to send a cashier's check to (we prefer bid bond over check if possible)
- Any bids submitted will not be visible to those of us at OSE until the day/time of the bid opening
- Once you submit your bid, you will receive an email acknowledging that it was received automatically
- You may withdraw your bid electronically at any time before the bid closes
- Bid Tabulations can be found here, after the bid closes
  - [OSE Pr https://www.sd.gov/cs/?id=ose\\_projects](https://www.sd.gov/cs/?id=ose_projects) - Citizen Services (sd.gov)

**EXHIBIT "C"**

**BID BOND**



**BID BOND**

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, \_\_\_\_\_

\_\_\_\_\_

as Principal, and \_\_\_\_\_

as Surety, are hereby held and firmly bound unto \_\_\_\_\_

as owner for the penal sum of \_\_\_\_\_ of which, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

Signed, this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_.

The condition of the above obligation is such that whereas the Principal has submitted to \_\_\_\_\_ a certain Bid, attached hereto and hereby made

a part hereof to enter into a contract in writing for the \_\_\_\_\_

NOW, THEREFORE,

- (a) If said Bid shall be rejected, or in the alternate
- (b) If said Bid shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract, attached hereto (properly completed in accordance with said bid) and shall furnish a bond for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said Bid.

Then this obligation shall be void, otherwise the same shall remain in force and effect: it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by any extensions of the time within which the Owner may accept such Bid; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

\_\_\_\_\_  
Principal (L.S.)

\_\_\_\_\_  
Surety

SEAL

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

## **EXHIBIT “D”**

### **PERFORMANCE AND PAYMENT BOND**

**Performance and Payment Bond form must be from OSE Website or the version sent from OSE with Contract.  
If example below is used, bond WILL BE REJECTED.**

**PERFORMANCE AND PAYMENT BOND**

KNOW ALL MEN BY THESE PRESENTS, THAT WE \_\_\_\_\_

\_\_\_\_\_

(Contractor – Name and address)

hereinafter called "Principal", and \_\_\_\_\_

\_\_\_\_\_

(Surety – Name and address)

a corporation, organized and existing under the laws of the State of \_\_\_\_\_, and duly authorized to transact business in the State of South Dakota, hereinafter called "Surety", are held and firmly bound unto the State of South Dakota, hereinafter called "Obligee", in the just and full sum of \_\_\_\_\_ Dollars(\$\_\_\_\_\_)

lawful money of the United States of America to be paid to the State of South Dakota, which payment to be made, we bind ourselves, our heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

The condition of this obligation is such that:

WHEREAS, Principal has been awarded a contract with Obligee for the construction of:

PROJECT NAME: **Barnett Center, Locker Room Remodel** \_\_\_\_\_

PROJECT LOCATION: **Northern State University, Aberdeen, SD** \_\_\_\_\_

PROJECT NUMBER: **R0124--16X** \_\_\_\_\_

which Contract is herein referred to and made a part hereof as fully and to the same extent as if the same were entirely written herein; and

WHEREAS, it was one of the conditions of the award by Obligee of the Contract that these presents should be executed.

PROVIDED, FURTHER, that the Surety, for consideration received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract, to work to be performed thereunder or to the specifications accompanying the Contract shall in any manner affect its obligation on this Bond. The Surety hereby does waive notice of any such change, extension of time, alteration or addition to the terms of the Contract, to the work or to the specifications. The Surety further stipulates and agrees that this Bond shall be valid and enforceable regardless of the time period between the date of execution of the Bond by the Surety and the date of execution of the Bond by the Principal.

PROVIDED, FURTHER, that no final settlement between the Obligee and the Principal shall abridge the right of any beneficiary hereunder whose claim may be unsatisfied.

NOW, THEREFORE, if the Principal in all respects complies with the terms and conditions of the Contract and his (their or its) obligations thereunder, including specifications therein referred to and made a part thereof and any alteration made in such specifications as herein or therein provided, then this obligation is void, but otherwise remains in full force and effect.

A further condition of this bond is that in the event the Principal fails to pay all just claims and demands on the part of any employee, person, firm or corporation for labor and materials furnished for or used in connection with the prosecution of the work under the Contract, or fails to pay any tax which may accrue to the State of South Dakota under the provisions of the "Use Tax Act of 1939 and The Excise Tax on Realty Improvements under SDCL 10-46A," and Sections 5-21-3 and 5-21-4 of the South Dakota Codified Laws, this bond and the sureties thereon shall be responsible to such person, firm or corporation and to the State of South Dakota for the full payment of the value of such labor and materials so furnished, including payment of South Dakota use taxes and excise taxes on realty improvements.

SIGNED AND SEALED THIS \_\_\_\_\_ DAY OF \_\_\_\_\_, 20\_\_\_\_.

**INDIVIDUAL PRINCIPAL**

By \_\_\_\_\_ Typed Name \_\_\_\_\_  
(Affix Seal if available)

**PARTNERSHIP, CORPORATE, OR LLC PRINCIPAL**

By \_\_\_\_\_ Typed Name \_\_\_\_\_

Title \_\_\_\_\_ Business Name \_\_\_\_\_  
(Affix Corporate Seal if available)

Address \_\_\_\_\_



**ACKNOWLEDGMENT OF PRINCIPAL  
(Partnership)**

State of \_\_\_\_\_ )  
 ) ss  
County of \_\_\_\_\_ )

On this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, before me personally appeared \_\_\_\_\_, who acknowledged himself/herself to be one of the partners of \_\_\_\_\_, a partnership, and that he/she, as such partner, being authorized so to do, executed the foregoing instrument for the purposes therein contained, by signing the name of the partnership by himself/herself as a partner.

\_\_\_\_\_  
Notary Public

My commission expires the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_.

**ACKNOWLEDGMENT OF PRINCIPAL  
(Corporation)**

State of \_\_\_\_\_ )  
 ) ss  
County of \_\_\_\_\_ )

On this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_ before me personally appeared \_\_\_\_\_, who acknowledged himself/herself to be the \_\_\_\_\_ of \_\_\_\_\_, a corporation, and that he/she, as such \_\_\_\_\_ being authorized so to do, executed the foregoing instrument for the purposes therein contained, by signing the name of the corporation by himself/herself as \_\_\_\_\_.

\_\_\_\_\_  
Notary Public

My commission expires the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_.





**ACKNOWLEDGMENT OF SURETY  
(Attorney-In-Fact)**

State of \_\_\_\_\_ )  
 )ss  
County of \_\_\_\_\_ )

On this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, before me personally appeared \_\_\_\_\_ known to me or satisfactorily proven to the person whose name is subscribed as attorney in fact for \_\_\_\_\_ and acknowledged that he/she executed the same as the act of his/her principal for the purpose therein contained.

IN WITNESS WHEREOF, I hereunto subscribed my name and affixed my official seal at \_\_\_\_\_, the day and year last above written.

\_\_\_\_\_  
Notary Public

My commission expires the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_.

**APPROVAL AS TO FORM**

Approved as to form this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_.

\_\_\_\_\_  
Assistant Attorney General

**EXHIBIT "E"**

**NON-RESIDENT BIDDER AFFIDAVIT**

**NON-RESIDENT BIDDER AFFIDAVIT**

Country of \_\_\_\_\_ )

)ss

State or Province of \_\_\_\_\_ )

Business Name: \_\_\_\_\_

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

\_\_\_\_\_

Affiant's Name and Title: \_\_\_\_\_

Project Name and Location: **Barnett Center, Locker Room Remodel, Northern State University, Aberdeen, SD**

OSE Project Number: **R0124--16X**

**AFFIDAVIT WHEN NO PREFERENCE IS GIVEN**

I do hereby affirm that \_\_\_\_\_ resides in the country of \_\_\_\_\_

\_\_\_\_\_ in the state or province of \_\_\_\_\_

and that said country and/or state or province does not grant a preference to resident bidders for work on behalf of said country, state or province.

Dated: \_\_\_\_\_

Signed \_\_\_\_\_

**AFFIDAVIT WHEN PREFERENCE IS GIVEN**

I do hereby affirm that \_\_\_\_\_ resides in the country of \_\_\_\_\_  
\_\_\_\_\_ in the state or province of \_\_\_\_\_  
and that said country and/or state or province does grant a preference to resident bidders for work on behalf of  
said country, state, or province, the nature and extent of such preference being \_\_\_\_\_  
\_\_\_\_\_.

Dated: \_\_\_\_\_

Signed \_\_\_\_\_

**ACKNOWLEDGEMENT OF AFFIANT**

Country of \_\_\_\_\_ )

)ss

State or Province of \_\_\_\_\_ )

On this \_\_\_\_\_ day of \_\_\_\_\_, 20, before me personally appeared  
\_\_\_\_\_, known to me to be the affiant who, being duly  
sworn, declares all statements made in this affidavit to be true and correct to the best of his or her knowledge.

\_\_\_\_\_  
Notary Public

My commission expires the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_.

**EXHIBIT "F"**

**CONTRACTOR'S STATEMENT OF SKILLS AND CAPABILITIES**

**STATE OF SOUTH DAKOTA  
OFFICE OF THE STATE ENGINEER**

**Contractor's Statement of Skills and Capabilities**

Send Completed Form to: Office of the State Engineer  
523 East Capitol  
Pierre, South Dakota 57501-3182  
Phone: 605.773.3466

**OSE Project:**

Project Name: **Barnett Center, Locker Room Remodel**  
Location: **Northern State University, Aberdeen, SD**  
OSE# **R0124--16X**

**CONTRACTOR INFORMATION**

**A. Business Structure**

**Submitted By:**

1. Current Business Name and Address.

Business Name:

Address:

Phone:

E-mail:

2. How many years has your company been in business under the name listed above?
3. Has your company been in business under any other business name(s)?  
If so, list previous business name(s) and the years your company operated under each name:

4. If a corporation, provide the:

Date and State of incorporation:

Type of corporation:

Names of Officers

President:

Vice-president(s):

Secretary:

Treasurer:

5. If a partnership, provide the:

State of Organization:

Partnership type:

Date of organization:

Names of partners:

6. If individual, provide:

Date of organization:

Name of owner:

7. Use this space to describe your company's business structure if it differs from those listed above:

8. List the states and trades in which you may legally do business where applicable. Provide registration or license number(s).

9. If your company is organized under the laws of another state, has it registered with the Secretary of State for the State of South Dakota and/or the Department of Revenue?

## **B. Background and History**

1. What types of Work does your company perform with its own forces?
  
2. Has your company ever failed to complete Work it had contracted to perform? Provide details if the answer is "yes."
  
3. Within the last five years, has any officer or principal of your company been an officer or principal of another company that failed to complete Work that the latter company contracted to perform? Provide details if "yes."
  
4. List any and all judgments, claims, suits at law, or arbitration proceedings pending or outstanding against your company or its officers regarding any construction contracts:
  
5. Within the last five years, has your company filed law suits or requested arbitration regarding any construction contracts?
  
6. On separate paper, provide a list of major construction projects your company is currently working on. For purposes of this document "major construction projects" shall be considered anything of average size or greater for your company. Provide name of owner, location, architect, contract amount, and scheduled completion.
  
7. On separate paper, list the major construction projects your company has completed in the last five years. For purposes of this document "major construction projects" shall be considered anything of average size or greater for your company. Provide name of owner, project, location, architect, contract amount, and scheduled completion.
  
8. On separate paper, list the construction background/experience of the key personnel in your company.
  
9. What is the average annual value of all construction work your company performed within the last five years?



**C. References**

1. List your company's Business/Industry References:
  
  
  
  
  
  
  
  
  
  
2. List your company's Financial References:
  
  
  
  
  
  
  
  
  
  
3. Provide the name and address of your company's Surety, as well as the name and address of the Agent:

SIGNATURE AND NOTARIZATION

Date \_\_\_\_\_

Typed Name: \_\_\_\_\_

Title: \_\_\_\_\_

\_\_\_\_\_

Business Name: \_\_\_\_\_

Signature

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

(Affix Seal)

\_\_\_\_\_

On this \_\_\_\_\_ day of \_\_\_\_\_, 20, before me personally appeared \_\_\_\_\_, known to me to be the affiant who, being duly sworn, declares all statements made in this affidavit to be true and correct to the best of his or her knowledge.

\_\_\_\_\_  
Notary Public

My commission expires the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_

**EXHIBIT "G"**

**RESIDENT AND NON-RESIDENT SUBCONTRACTOR BREAKOUT**

**Resident and Non-resident Subcontractor Breakout**

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

Contract Amount: \_\_\_\_\_

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

Re: **Barnett Center, Locker Room Remodel**  
**Northern State University**  
**Aberdeen, SD**  
**OSE# R0124--16X**

Resident Contractors

Company	Location	Labor Cost	% Value of Contract
Total:			

Non- Resident Contractors

Company	Location	Labor Cost	% Value of Contract
Total:			

As defined in 5-18A:

(26) "Resident," any person, partnership, association, limited liability company, foreign limited liability company, corporation, or foreign corporation licensed to do business within this state that has maintained a substantial and bona fide place of business and has conducted business from within this state for at least one year prior to the date on which a contract was awarded. The members of the partnership or association shall have been bona fide residents of the state for one year or more immediately prior to bidding upon the contract. A foreign corporation licensed pursuant to §§ 47-1A-1501 to 47-1A-1532, inclusive, is not a resident as defined by this section if the state or country in which it is organized enforces or has a preference for resident bidders;

If more than 20% of the labor cost included in the contract is being provided by nonresident subcontractors, please explain: \_\_\_\_\_

---



---



---



---



---

# **AGREEMENT FOR CONSTRUCTION**

PLANS AND SPECIFICATIONS PREPARED  
BY  
???

PROJECT: ???  
???  
???  
OSE# ???

**AGREEMENT FOR CONSTRUCTION**  
PRIME CONTRACT

THIS Agreement is made the ??? day of ???, ??? by and between ???, ???, ??? (the "Contractor") and the State of South Dakota, acting through ??? (the "Owner") and its representative the Office of the State Engineer.

WITNESSETH, that the Contractor and the Owner for the consideration stated herein agree as follows:

**ARTICLE I, CONTRACT DOCUMENTS:**

The following documents and any other documents incorporated in them by reference constitute the contract documents:

1. This Agreement
2. The Project Manual dated \_\_\_\_\_ ???
3. The Project Drawings dated \_\_\_\_\_ ???
4. Addenda issued prior to execution of this Agreement
5. Contractor's Performance and Labor and Material Payment Bond
6. Value Engineering Letter dated \_\_\_\_\_ (if there is a VE letter, list here or add "N/A")

These documents constitute the entire and integrated agreement between the parties hereto and supersede prior negotiations, representations, or agreements, either written or oral. The Index for items 2 and 3 is attached hereto as Exhibit "A."

**ARTICLE II, STATEMENT OF WORK:**

To the extent not otherwise provided in the contract documents, Contractor shall furnish and pay for all labor, tools, equipment, supplies, materials, appurtenances, utilities, charges, fees, permits, and all other construction accessories and services required to complete the work specified in the contract documents in strict compliance with the contract documents.

**ARTICLE III, DATE OF COMMENCEMENT AND COMPLETION:**

The work shall be commenced within ten (10) consecutive calendar days after the date of issuance of the Notice to Proceed by the Owner and shall be substantially completed not later than ???, and completed and ready for final inspection/acceptance no later than ???, subject to adjustments of the contract time as provided in the contract documents. Should the Contractor fail to substantially complete the work within the time set forth herein, or within such extra time as may have been allowed by increases in the contract, or by formally approved extensions granted by the Owner, the Contractor and the Contractor's surety shall be liable for and shall pay the Owner \$??? per calendar day as liquidated damages for each calendar day of delay until the work is substantially complete. After Substantial Completion, if the Contractor shall neglect, refuse, or fail to complete the remaining Work as outlined in the approved punch list, subject to adjustments of the contract time as provided in the contract documents, the Contractor shall be liable for and shall pay the Owner \$??? as liquidated damages for each calendar day of delay until the Work is completed and ready for final inspection/acceptance.

If split completion date, use the following language: "...by the Owner, Phase 1 shall be substantially completed not later than ???, and Phase 2 shall be substantially completed not later than ???, subject to..."

Or

If split completion date, use the following language: "...by the Owner, Phase 1 shall be substantially completed not later than ???, and Phase 2 shall be substantially completed not later than ???, and completed and ready for final inspection/acceptance no later than ??? subject to...

**ARTICLE IV, CONTRACT SUM:**

- A. For the performance of the work specified in the Contract Documents, Owner will pay Contractor and Contractor will accept as full compensation the sum of ??? (???) , subject to additions or deductions as provided in the contract documents;
- B. Contract sum includes the following alternates, if any, which are described in the Contract Documents and are hereby, accepted by the Owner: **N/A** (if there are alternates, list below AND remove "N/A")

Alternate	Short Description	Price
1		\$
2		\$

- C. Unit Prices, if any, are as follows: **N/A** (if there are unit prices, list below AND remove "N/A")

Unit Price	Short Description	As-bid Price
1		\$ per Unit
2		\$ per Unit

Where the quantities originally contemplated are so changed that application of the agreed unit price to the quantity of work performed is shown to create a hardship to the Owner or the Contractor, there shall be an equitable adjustment of the contract to prevent such hardship.

- D. Contract sum includes the following value engineering items, if any, which are described in the Contract Documents and are hereby, accepted by the Owner: **N/A** (if there are VE items, list below AND remove "N/A")

VE Item	Short Description	Modified Price
1		(\$)
2		(\$)

**ARTICLE V, PROGRESS PAYMENTS:**

The Owner shall make progress payments on a monthly basis for work accomplished in accordance with General Conditions, Article 11.

**ARTICLE VI, ACCEPTANCE AND FINAL PAYMENT:**

Final payment less amounts withheld to cover the cost of nonconforming work, shall be made by the Owner in accordance with General Conditions Sub-Article 11.8.

Prior to issuing final payment, the Contractor shall provide Operation and Maintenance Manuals for all material and equipment that requires operation and maintenance work. Operation and Maintenance Manuals shall be as follows:

- A. Hard Copies: ??? 3-ring bound copy

- B. Electronic Copies: 1 single PDF file

**ARTICLE VII, NOTICE:**

All notices, demands and other communications required by the Contract Documents shall be in writing and shall be deemed to have been duly given if personally delivered, mailed first class (postage prepaid), or e-mailed:

**If to Contractor:**

???  
???  
???  
???  
Phone: ???  
???

**If to the Architect/Engineer:**

???  
???  
???  
???  
Phone: ???  
???

**If to Owner:**

Stacy Watters, P.E., State Engineer  
Office of the State Engineer  
523 East Capitol  
Pierre, South Dakota 57501-3182  
Phone: 605.773.3466  
[Stacy.Watters@state.sd.us](mailto:Stacy.Watters@state.sd.us)

Either party may change the addresses set forth for notice herein upon written notice thereof to the other.

**ARTICLE VIII, INDEPENDENT CONTRACTOR**

While performing services hereunder, Contractor is an independent contractor and not an officer, agent, or employee of the State of South Dakota.

**ARTICLE IX, CERTIFICATIONS**

- A. Certifications regarding debarment, suspension, and voluntary exclusion

By signing this Agreement, Contractor certifies that neither Contractor nor its principals are presently debarred, suspended, proposed for debarment or suspension, declared ineligible, or voluntarily excluded from participating in transactions by the federal government or any state or local government department or agency. Contractor further agrees that it will immediately notify State if during the term of this Agreement Contractor or its principals become subject to debarment, suspension or ineligibility from participating in transactions by the federal government, or by any state or local government department or agency.

- B. Compliance with Executive Order 2020-01

Executive Order 2020-01 provides that for contractors, vendors, suppliers or subcontractors with five (5) or more employees who enter into a contract with State that involves the expenditure of one hundred thousand dollars (\$100,000) or more, by signing this Agreement Contractor certifies and agrees that it has not refused to transact business activities, has not terminated business activities, and has not taken other similar actions intended to limit its commercial relations, related to the subject matter of this Agreement, with a person or entity that is either State of Israel, or a company doing business in or with Israel or authorized by, licensed by, or organized under the laws of State of Israel to do business, or doing business in State of Israel, with the specific intent to accomplish a boycott or divestment of Israel in a discriminatory manner. It is understood and agreed that, if this certification



is false, such false certification will constitute grounds for State to terminate this Agreement. Contractor further agrees to provide immediate written notice to State if during the term of this Agreement it no longer complies with this certification and agrees such noncompliance may be grounds for termination of this Agreement.

C. Compliance with SDCL ch. 5-18A

Contractor certifies and agrees that the following information is correct:

Contractor is not an organization, association, corporation, partnership, joint venture, limited partnership, limited liability partnership, limited liability company, or other entity or business association, including all wholly-owned subsidiaries, majority-owned subsidiaries, parent companies, or affiliates, of those entities or business associations, regardless of their principal place of business, which is ultimately owned or controlled, directly or indirectly, by a foreign parent entity from, or the government of, the People's Republic of China, the Republic of Cuba, the Islamic Republic of Iran, the Democratic People's Republic of Korea, the Russian Federation, or the Bolivarian Republic of Venezuela.

It is understood and agreed that, if this certification is false, such false certification will constitute grounds for the purchasing agency to reject the bid or response submitted by, or on behalf of, Contractor on this project and terminate any contract awarded based on the bid or response, and further would be cause to suspend and debar a business under SDCL § 5-18D-12.

Contractor further agrees to provide immediate written notice to the purchasing agency if during the term of the contract it no longer complies with this certification and agrees such noncompliance may be grounds for contract termination and would be cause to suspend and debar a business under SDCL § 5-18D-12.

D. Certification of No State Legislator Interest

Contractor (i) understands neither a state legislator nor a business in which a state legislator has an ownership interest may be directly or indirectly interested in any contract with the State that was authorized by any law passed during the term for which that legislator was elected, or within one year thereafter, and (ii) has read South Dakota Constitution Article 3, Section 12 and has had the opportunity to seek independent legal advice on the applicability of that provision to this Agreement. By signing this Agreement, Contractor hereby certifies that this Agreement is not made in violation of the South Dakota Constitution Article 3, Section 12.

## ARTICLE X, AUTHORITY TO EXECUTE

Contractor represents and warrants that:

- A. Contractor is a corporation duly incorporated, a limited liability company duly formed, or a limited liability partnership duly formed; is validly existing and in good standing under the laws of its state of incorporation or formation; and has all requisite corporate or organizational power and authority to execute, deliver, and perform its obligations under this Agreement.
- B. The execution, delivery and performance of this Agreement has been duly authorized by Contractor; the individual(s) signing this Agreement on behalf of Contractor are authorized under the terms of its governing documents; and no approval, authorization or consent of any member, private party, governmental or regulatory agency is required in order for Contractor to enter into this Agreement and perform its obligations under this Agreement that has not been obtained.



OWNER: STATE OF SOUTH DAKOTA (DELETE ANY UN-NEEDED SIGNATURE BLOCKS)

\_\_\_\_\_  
??? (Date)  
\_\_\_\_\_  
???  
\_\_\_\_\_  
???

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NAME (Date)  
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Title  
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AGENCY/CAMPUS

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NAME (Date)  
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Title  
\_\_\_\_\_  
AGENCY/CAMPUS

All Required Documents Received

\_\_\_\_\_  
??? (Date)  
\_\_\_\_\_  
???

REVIEWED BY: (AND/DELETE ANY UN-NEEDED REVIEW BLOCKS - replace "NAME" with approver's name)

NAME \_\_\_\_\_  
NAME \_\_\_\_\_  
NAME \_\_\_\_\_  
NAME \_\_\_\_\_

Exhibit "A"  
AGREEMENT FOR CONSTRUCTION  
Enumeration of Contract Documents

1. This agreement
2. The General and Special Conditions contained in the Project Manual dated ???.
3. The Invitation for Bids and Instruction to Bidders contained in the Project Manual dated ???.
4. The Specifications are those contained in the Project Manual dated ??? and are as follows:

Section	Title	Pages
See Attached Index		???

5. The drawings are as follows:

Number	Title	Date
See Attached Sheet Index		???

6. The addenda, if any, are as follows:

Number	Date	Pages
####	DATE	# OF PAGES
####	DATE	# OF PAGES
####	DATE	# OF PAGES

7. Value Engineering Letter dated N/A [if there are VE items, enter letter date AND remove "N/A"]

8. The Performance and Labor and Material Payment Bond dated \_\_\_\_\_  
Issued by \_\_\_\_\_ . Bond # \_\_\_\_\_.

9. Other documents forming a part of the Contract Documents are:

**GENERAL CONDITIONS**

TO

AGREEMENT FOR CONSTRUCTION

FOR

**Barnett Center, Locker Room Remodel  
Northern State University  
Aberdeen, SD  
OSE# R0124--16X**

Definitions ..... 1

Execution, Correlation & Intent..... 2

Ownership, Use of Documents, Confidentiality of Documents ..... 3

Ownership of Work Product ..... 3.1

Confidentiality of Documents ..... 3.2

Return of Documents ..... 3.3

Terms to Be Included in Subcontracts..... 3.4

A/E's Responsibilities..... 4

Owner's Rights & Responsibilities ..... 5

Information & Services Required of the Owner ..... 5.1

Owner's Right to Stop the Work..... 5.2

Owner's Right to Carry Out the Work ..... 5.3

Owner's Right to Access for Observation or Other Work ..... 5.4

Contractor's Responsibilities ..... 6

Review of Contract Documents..... 6.1

Supervision & Construction Procedures..... 6.2

Labor & Materials ..... 6.3

Substitutions..... 6.3.4

Guarantees/Warranty ..... 6.4

Taxes..... 6.5

Permits, Fees & Notices..... 6.6

Superintendent..... 6.7

Construction Progress Schedule..... 6.8

Documents & Samples at the Site ..... 6.9

Shop Drawings, Product Data & Samples..... 6.10

Shop Drawing & Product Data Procedures ..... 6.10.9

Samples Procedures ..... 6.10.10

Use of Site..... 6.11

Cutting & Patching of Work..... 6.12

Cleaning Up ..... 6.13

Communications..... 6.14

Royalties & Patents ..... 6.15

Indemnification ..... 6.16

Default ..... 6.17

Subcontractors ..... 7

Definitions ..... 7.1

Award of Subcontracts & Other Contracts..... 7.2

Subcontractual Relations..... 7.3

Work by Owner or by Separate Contractors ..... 8

Owner's Right to Perform Work & Award Separate Contracts ..... 8.1

Mutual Responsibility ..... 8.2

Owner's Right to Clean Up ..... 8.3

Miscellaneous Provisions .....	9
Governing Law .....	9.1
Successors & Assigns .....	9.2
Written Notice .....	9.3
Claims for Damages .....	9.4
Performance & Labor and Material Payment Bond .....	9.5
Rights & Remedies .....	9.6
Tests .....	9.7
Litigation .....	9.8
Time .....	10
Definitions .....	10.1
Progress & Completion .....	10.2
Delays & Extensions of Time .....	10.3
Beneficial Occupancy .....	10.4
Payments & Completion .....	11
Contract Sum .....	11.1
Schedule of Values .....	11.2
Monthly Application for Payment .....	11.3
Recommendation for Payment .....	11.4
Progress Payments .....	11.5
Payments Withheld .....	11.6
Substantial Completion .....	11.7
Final Completion & Final Payment .....	11.8
Protection of Persons & Property .....	12
Safety Precautions & Programs .....	12.1
Safety of Persons & Property .....	12.2
Emergencies .....	12.3
Insurance .....	13
Commercial General Liability Insurance .....	13.1.1
Business Automobile Liability Insurance .....	13.1.2
Worker’s Compensation Insurance .....	13.1.3
Builder’s Risk Insurance .....	13.1.4
Installation Floater Insurance .....	13.1.5
Changes in the Work .....	14
Change Orders .....	14.1
Site Conditions .....	14.4
Claims for Additional Cost .....	14.5
Minor Changes in the Work .....	14.6
Uncovering & Correction of Work .....	15
Uncovering of Work .....	15.1
Correction of Work .....	15.2
Acceptance of Defective or Non-Conforming Work .....	15.3
Termination of the Contract .....	16
Termination by the Contractor .....	16.1
Termination by the Owner .....	16.2
Termination for Convenience .....	16.3

## **Article 1 Definitions**

- 1.1 Owner: The owner is the State of South Dakota acting through the legally appointed commissioner for the Bureau of Administration and his representative, the Office of the State Engineer.
- 1.2 Architect/Engineer: The term "architect/engineer" (hereinafter A/E) means the person or entity identified as such on the cover sheet to the drawings or plans and his/her authorized representative including his/her consulting engineer(s).
- 1.3 Contractor: The term "contractor" means the person or entity identified as such in the Agreement for Construction and his authorized representatives.
- 1.4 Subcontractor: Any individual, firm or corporation to whom the Contractor sublets any part of the contract for supplying materials and labor, or only labor, at the site of the project.
- 1.5 The Contract Documents: The documents identified as the Contract Documents in the Agreement for Construction.
- 1.6 The Contract: The Contract Documents form the contract. The contract may be amended or modified only in writing in the manner set forth in Article 14. Nothing contained in the Contract Documents shall create any contractual relationship between the owner and any subcontractor, sub-subcontractor or supplier.
- 1.7 The Work: The completed construction required by the Contract Documents, and every part thereof, and includes all labor necessary to produce such construction, and all materials and equipment incorporated or to be incorporated into such construction.
- 1.8 The Project: The total construction of which the work performed under the Contract Documents may be the whole or a part.
- 1.9 The Drawings or Plans: The graphic and pictorial portions of the Contract Documents showing the design, dimensions and layout of the work including, but not limited to, plan views, elevation views, details, sections, schedules, and diagrams.
- 1.10 The Specifications: The written requirements in the Contract Documents for materials, equipment, construction systems, standards and workmanship.
- 1.11 The Project Manual: The manual compiled for the work containing the Invitation for Bid, Instructions to Bidders, blank form of Bid Bond, blank form of Agreement for Construction, blank form of Performance and Labor and Material Payment Bond, sample forms, General Conditions, and Special Conditions.



**Article 2**  
**Execution, Correlation and Intent**

2.1 By executing the contract, the contractor represents he has examined the plans, specifications, site of the proposed Work and Contract Documents in accordance with the requirements of the Instructions to Bidders.

2.2 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work. The Contract Documents are complementary, and what is required by any one shall be as binding as if required by all. Work not covered in the Contract Documents will not be required unless it is consistent therewith and is reasonably inferable therefrom as being necessary to produce the intended results. Words and abbreviations which have well-known technical or trade meanings are used in the Contract Documents in accordance with such recognized meanings. All work mentioned or indicated in the Contract Documents shall be performed by the Contractor as part of this Contract unless it is specifically indicated in the Contract Documents that such work is to be done by others. Should the Drawings or the Specifications disagree in themselves or with each other, the Contractor shall provide the better quality or greater quantity of work and/or materials unless otherwise directed by written change.

2.3 The organization of the Specifications into Divisions, Sections and Articles, and the arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of work to be performed by any trade.

2.4 Neither the Owner nor the A/E assumes any liability arising out of jurisdictional issues raised or claims advanced by trade organizations or other interested parties based on the arrangement or manner of subdivision of the content of the Specifications and Drawings.

2.5 The Contractor and all Subcontractors shall refer to all of the Drawings, including those showing primarily the work of the mechanical, electrical, and other specialized trades, and to all of the Sections of the Specifications, and shall perform all work reasonably inferable therefrom as being necessary to produce the indicated results. The Contractor shall promptly report any discrepancy or omission which it observes in the Construction Documents and any need for clarification or interpretation to the Owner and the A/E. The Contractor's failure to do so will cause any additional cost incurred by the Contractor to be its sole responsibility. The Contractor shall number Requests for Information in consecutive order. The Contractor shall maintain a log of each Request for Information indicating the date it was issued, the date or dates of any correspondence and/or discussions on the Request for Information, and the date a final answer is received.

2.6 The General Conditions and the Special Conditions are a part of each Section of the Specifications. The Special Conditions for Mechanical and Electrical Trades, if any, are part of each Section of the Specifications referenced therein, and apply to the work of the trades affected thereby.

2.7 A typical or representative detail indicated on the Drawings shall constitute the standard for workmanship and material throughout corresponding parts of the Work. Where necessary, and where reasonably inferable from the Construction Documents, the Contractor shall adapt such representative detail for application to such corresponding parts of the Work. The details of such adaptation shall be subject to prior approval by the A/E. Repetitive features shown in outline on the drawings shall be in exact accordance with corresponding features completely shown.

2.8 The layout of mechanical and electrical systems, equipment, fixtures, piping, ductwork, conduit, specialty items, and accessories indicated on the Drawings is diagrammatic, and all variations in alignment, elevation, and detail required to avoid interferences and satisfy architectural and structural limitations are not necessarily shown. Actual layout of the Work shall be carried out without affecting the architectural, engineering and structural integrity and limitations of the Work and shall be performed in such sequence and manner as to avoid conflicts, provide clear access to all control points, including valves, strainers, control devices, and specialty items of every nature related to such systems and equipment, obtain maximum headroom, and provide adequate clearances as required for operation and maintenance.

2.9 The Drawings shall not be scaled for dimensions. If figured dimensions are not given on the Drawings, the Contractor shall request same from the A/E giving reasonable advance notice.

2.10 All indications or notations which apply to one of a number of similar situations, materials or processes shall be deemed to apply to all such situations, materials or processes wherever they appear in the Work, except where a contrary result is clearly indicated by the Contract Documents.

2.11 Where codes, standards, requirements and publications or public and private trade associations or other bodies are referred to in the Specifications, references shall be understood to be in the latest revision prior to the date of receiving bids, except where otherwise indicated.

2.12 Where no explicit quality or standards for materials or workmanship are established for work, such work is to be of good quality for the intended use and consistent with the quality of the surrounding work, of the construction of the Project generally, and industry standards.

2.13 All manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with the manufacturer's written or printed directions and instructions unless otherwise indicated in the Contract Documents. A copy of the manufacturer's written or printed directions shall be provided to the Owner upon completion of the project.

**Article 3**  
**Ownership, Use of Documents, Confidentiality of Documents.**

**3.1 Ownership of Work Product**

Any plans, specifications, engineering calculations, technical data, reports, miscellaneous drawings, and all information contained therein provided by the State, its consultants, employees, contractors and agents to the contractor for the contractor's performance of its obligations under this agreement are the property of the State. They are to be used only with respect to this Project and are not to be used for any other project. The contractor may not disseminate these materials to any person or entity nor may the contractor use these materials for purposes other than work for the state, without the express written approval of the state. The state shall not unreasonably withhold such approval for dissemination of these materials as necessary to subcontractors and suppliers.

**3.2 Confidentiality of Documents**

All reports, plans, specifications, engineering calculations, technical data, miscellaneous drawings, and information contained therein provided to or prepared by the contractor, its owners, officers, employees, agents, consultants, suppliers, and subcontractors in connection with the contractor's performance under this Agreement are confidential and the contractor, its owners, officers, employees, agents, consultants, suppliers, and subcontractors shall not disclose this information to any person, individual, or entity without the express written permission of the state.

**3.3 Return of Documents**

All documents covered by Article 3 shall be delivered to the A/E at the completion of the work. The contractor may not retain any such documents for its own use without the express written permission of the state and any documents that are retained, with or without state permission, shall be subject to all of the requirements of Article 3.

**3.4 Terms to be Included in Subcontracts**

The contractor shall include the requirements of Article 3 in any contract it enters into with any consultants, subcontractors, suppliers, persons, individuals, or entities for the performance of any of the contractor's obligations under this agreement.

**Article 4**  
**A/E'S RESPONSIBILITIES**

4.1 The A/E, under the direction of the State Engineer, will provide administration of the Contract as hereinafter described. The A/E will represent the Owner during construction. The A/E will advise and consult with the Owner. The Owner's instructions to the Contractor may be forwarded through the A/E. The A/E will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents, unless otherwise modified by written instrument in accordance with Sub-Article 4.15.

4.2 The Contractor shall accept instructions only from the A/E or State Engineer, and not the A/E's consulting engineers, except as the A/E and State Engineer shall authorize in writing.

4.3 The A/E will visit the construction site at intervals appropriate to the stage of construction to keep generally familiar with the progress and quality of the work completed and to determine in general if the Project is being constructed in a manner such that when completed it would be in conformance with the plans and specifications and other Contract Documents. The A/E will not, however, be required to make exhaustive or continuous on-site inspections to check the quality or quantity of work. On the basis of such observations or inspections, the A/E shall keep the Owner informed of the progress and quality of the work on the Project and endeavor to guard the Owner against defects and deficiencies in the work of the Contractor. The A/E will maintain written reports of all site visits.

4.4 The A/E shall not have control over or charge of and shall not be responsible for construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Project, since these are solely the Contractor's responsibilities under the Agreement for Construction. The A/E shall not be responsible for the Contractor's schedules or failure to carry out the Project in accordance with the Contract Documents. The A/E shall not have control over or charge of acts or omissions of the Contractor, Subcontractors, or their agents or employees, or of any other persons performing portions of the Project, except to the extent that the A/E may formally notify the Contractor of the unacceptability of various portions of the Project or failure to carry out the Work on the Project in accordance with the Contract Documents.

4.5 The A/E will inform the Contractor on behalf of and in consultation with the Owner to cease work on the Project or portions thereof affected by those items that are unacceptable and remain uncorrected until such time as corrections are made.

4.6 The A/E shall at all times have access to the Work wherever it is in preparation and progress. The Contractor shall provide facilities for such access so the A/E may perform his functions under the Contract Documents.

4.7 Except as may otherwise be provided in the Contract Documents or when direct communications have been approved by the A/E, the Owner and its representatives and the Contractor shall communicate through the A/E. Communications by and with the A/E's consultants shall be through the A/E.

4.8 The A/E will determine the amounts owing to the Contractor based on inspections and observations at the site, and on evaluations of the Contractor's Monthly Applications for Payment, and shall issue Certificates of Payment for amounts due on forms provided by the State Engineer. A Certificate of Payment constitutes a representation by the A/E to the Owner, based upon the inspections and the information provided by the Contractor in the Application, that the Project has progressed to the point indicated; that to the best of the A/E's knowledge, information and belief, the quality of the work on the Project is in accordance with the Contract Documents; and that the Contractor is entitled to payment in the amount certified.

4.9 The A/E shall have authority to reject work on the Project which does not conform to the Contract Documents. Whenever the A/E considers it necessary or advisable for implementation of the intent of the Contract Documents, the A/E will have authority to recommend to the Owner additional inspection or testing of the Work in accordance with the provisions of the Contract Documents, whether or not such work is fabricated, installed or completed. However, neither this authority of the A/E nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the A/E to any Construction Contractor, Subcontractors, material and equipment suppliers, their agents or employees or other persons performing portions of the work on the Project.

4.10 The A/E shall review and approve or take other appropriate action on Shop Drawings, Product Data and Samples submitted by Construction Contractors to determine if they conform with the design concept for the Project and with the information provided in the Contract Documents, and submit these documents or information to the Owner indicating the A/E's approval or comments with reasonable promptness so as to cause no delay to the prosecution of the Project.

Approval or acceptance of a specific item shall not necessarily indicate the A/E's approval of an assembly of which the item is a component. When professional certification of equipment is required by the Contract Documents, the A/E will be entitled to rely upon that certification to determine that the materials, systems, or equipment will meet the performance criteria required in the Contract Documents.

4.11 The A/E will conduct, at the time and place approved by the Owner, with representatives of the State agencies involved in the Project and the Contractor, inspections to establish dates of Project acceptance and completion. The A/E shall have other A/Es, Structural, Mechanical, or Electrical Engineers, or other consultants in their employ in attendance at this and at various progress inspections as may be necessary to evaluate whether the work completed on the Project is in conformance with the Contract Documents. The A/E will receive and forward to the Owner, with comments on completeness or acceptability, those warranties, operation manuals, and other documents required by the Contract Documents and assembled by the Contractor.

4.12 The A/E will review the final estimate for final payment to the Contractor and provide a Certificate of Final Payment to the Owner.

4.13 The A/E will provide to the Owner or the Contractor, upon written request in the form of a Request for Information, interpretations and decisions in writing, or in the form of drawings, on matters concerning performance under the Contract Documents, and execution or performance of the Work on the Project. Response to such requests shall be made with reasonable promptness and within any time limits agreed upon. The final decision on all such questions shall be made by the State Engineer.

4.14 The A/E will prepare Change Orders in accordance with Article 14, and will have authority to order minor changes in the Work as provided in Sub-Article 14.6.

4.15 The duties, responsibilities and limitations of authority of the A/E as the Owner's representative during construction as set forth in the Contract Documents will not be modified or extended without written consent of the Owner, the Contractor and the A/E.

4.16 In case of the termination of the employment of the A/E, the Owner shall appoint a replacement A/E whose status under the Contract Documents shall be that of the former A/E.

**Article 5**  
**OWNER'S RIGHTS AND RESPONSIBILITIES**

5.1 Information and Services Required of the Owner.

5.1.1 The Owner shall furnish a survey describing the legal limitations and utility locations for the site of the project.

5.1.2 The Owner shall secure and pay for necessary easements, and other property rights required for the construction of the Project.

5.1.3 Information under the Owner's control shall be furnished by the Owner with reasonable promptness after receipt from the Contractor of a written request for such information.

5.1.4 Unless otherwise provided in the Contract Documents, the Contractor will be furnished, free of charge, 2 sets of paper prints of Drawings and 3 sets of Specifications necessary for the execution of the Work.

5.1.5 The Owner may forward instructions to the Contractor through the A/E or give instructions through the State Engineer.

5.1.6 The foregoing are in addition to other duties and responsibilities of the Owner enumerated herein and especially those in respect to Work by the Owner or by separate contractors, Payments and Completion, and insurance in Articles 8, 10, 11 and 13.

5.2 Owner's Right to Stop the Work: If the Contractor fails to correct defective Work as required by Article 15 or fails to carry out the Work in accordance with the Contract Documents in any material respect, the Owner, in addition to its other remedies, by a written order signed by the State Engineer or by the State Engineer's designated representative may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of the Owner to stop the Work shall not give rise to any duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity.

5.3 Owner's Right to Carry Out the Work: If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents in any material respect and fails within three working days after receipt of written notice from the Owner or in such time as may be established in written notice from Owner to commence and continue correction of such default or neglect with diligence and promptness, or if the Work is not being performed properly or in accordance with the scheduling provisions of the Contract Documents in any material respect, whether or not the Contractor is in default, the Owner may, after the expiration of such notice period and without prejudice to any other remedy he may have, make good such deficiencies. In such case an appropriate Change Order shall be issued deducting from the payments then or thereafter due the Contractor the cost of correcting such deficiencies, including compensation for the A/E's and State Engineer's additional services made necessary by such default, neglect or failure. If the payments then or thereafter due the contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the Owner upon demand. If, in the sole judgment of the Owner, an emergency exists as a result of the Contractor's default, neglect or failure to correct defective work, which in the Owner's opinion, requires more immediate corrective action than the Contractor is able to provide, then the Owner may, without notice to the Contractor, perform such corrective work or cause it to be performed by others. The Owner shall also have the right to carry out the Work, or any part thereof, during the period of any work stoppage without terminating the Contract. If the Owner wishes to exercise this right it will give the Contractor three days notice of its intent to do so. In any such case, an appropriate deductive Change Order shall be issued in accordance with Article 14, the amount of which shall not exceed an amount which equals the estimated direct cost, including the State Engineer's fees, of performing the work which the Owner elects to perform and the proportionate amount of the Contractor's fee associated therewith.

5.4 Owner's Right to Access for Observation or Other Work: The Owner reserves the right of access to any part of the Work, at any time, for the purpose of observation, or testing, or to install other work, either with its own forces or with separate contractors. Such access is not to be construed to mean partial occupancy by Owner, and no claim for additional compensation by the Contractor because of such access or installation of work will be considered. Contractor shall cooperate with Owner during Owner's access or performance of work.

**ARTICLE 6**  
**CONTRACTOR'S RESPONSIBILITIES**

6.1 Review of Contract Documents: The Contractor shall carefully study and compare the Contract Documents and shall at once report to the Owner and the A/E any error, inconsistency or omission he may discover. The Contractor shall not be liable to the Owner or the A/E for any damage resulting from any such errors, inconsistency or omission he may discover and report, nor for any damage resulting from any such errors, inconsistencies or omissions which he could not reasonably have discovered. The Contractor shall perform no portion of the work at any time without Construction Documents or, where required, Shop Drawings, Product Data or Samples for such portions of the Work bearing the A/E's appropriate action stamp.

6.2 Supervision and Construction Procedures.

6.2.1 The Contractor shall supervise and direct the Work, using the skill and attention necessary to complete the Work in a workmanlike manner. The Contractor shall be solely responsible for all construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the contract. Neither the Owner nor the A/E shall have control over, or responsibility for, any such matters.

6.2.2 Nothing contained in the Contract Documents shall be interpreted by implication or otherwise as a direction by the A/E or the Owner to the Contractor as to construction means, methods, techniques, sequences and procedures. If there is express reference to such means, methods, techniques, sequences and procedures, it is solely for the purpose of insuring that the Work will be produced in accordance with the desired objectives as set forth in the Construction Documents but such express reference shall in no way relieve the Contractor of his responsibilities in connection therewith. If the Contractor does not wish to accept the responsibility for any means, techniques, sequences or procedures which are expressly set forth in the Construction Documents, then the contractor shall notify the A/E in writing of the actual means, methods, techniques, sequences and procedures which he will employ on the Work if these differ from those expressly referred to in the Construction Documents. All loss, damage or liability or cost of correcting defective Work arising from the employment of any construction means, methods, techniques, sequences or procedures shall be borne by the Contractor notwithstanding that any of the same shall have been referred to expressly in the Construction Documents.

6.2.3 The Contractor shall be responsible to the Owner for the acts and omissions of his employees, Subcontractors, Sub-subcontractors, materialmen and suppliers and their agents and employees, and other persons performing any of the Work.

6.2.4 The Contractor shall not be relieved from his obligations to perform the Work in accordance with the Contract Documents either by the activities or duties of the A/E in his administration of the Contract, by the use or occupancy of part of the Work by the Owner as provided in Sub-Article 5.4, by the performance of work related to the Project by others as provided in Sub-Article 8.1, or by inspections, tests or approvals required or performed under Sub-Article 9.7 by persons other than the Contractor.

6.2.5 The Contractor shall retain a competent Registered Professional Engineer or Registered Land Surveyor, acceptable to the Owner and A/E, who shall establish the exterior lines and required elevations of all buildings and structures to be erected on the site and shall establish sufficient lines and grades for the construction of associated work such as, but not limited to, roads, utilities and site grading. The Engineer or Land Surveyor shall certify as to the actual location of the constructed facilities in relation to property lines, building lines, easements, and other restrictive boundaries.



6.2.6 The Contractor shall establish the building grades, lines, levels, column, wall and partition lines required by the various Subcontractors in laying out their work.

6.2.7 The Contractor shall coordinate and supervise the work performed by Subcontractors to the end that the work is carried out without conflict between trades or jurisdictional disputes and so that no Subcontractor, at any time, causes delay to the general progress of the Work. The Contractor and all Subcontractors shall at all times afford each other Subcontractor, any separate contractor, and the Owner, every reasonable opportunity for the installation of work and the storage of materials, and shall provide access to and the use of necessary loading dock and hoist facilities, adequate storage room and necessary utilities and other services.

6.2.8 Wherever the work of a Subcontractor is dependent upon the work of other Subcontractors, or the Contractor, the Contractor shall require the Subcontractor to:

6.2.8.1 Coordinate his work with the dependent work;

6.2.8.2 Provide necessary dependent data and requirements;

6.2.8.3 Supply and/or install items to be built into dependent work of others;

6.2.8.4 Make provisions for dependent work of others;

6.2.8.5 Examine dependent drawings and specifications;

6.2.8.6 Examine previously placed dependent work;

6.2.8.7 Check and verify dependent dimensions of previously placed work;

6.2.8.8 Notify Contractor of previously placed dependent work or dependent dimensions which are unsatisfactory or will prevent a satisfactory installation of his work; and

6.2.8.9 Not proceed with his work until the unsatisfactory dependent conditions have been corrected.

Installation of Work by a Subcontractor in any given area shall constitute acceptance by the Subcontractor and Contractor of the previously placed dependent work.

### 6.3 Labor and Materials.

6.3.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for all labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for the proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work. The word "provide" shall mean furnish and install complete, including connections, unless otherwise specified. All connection charges, assessments or inspection fees which may be imposed by any public agency or utility company are included in the Contract Sum and shall be the Contractor's responsibility, except the final water and sewer connection charges which shall be paid by the Owner.

6.3.2 The Contractor shall at all times enforce strict discipline and good order among his employees and shall not employ on the Work any unfit person or anyone not skilled in the task assigned to him. The Contractor shall be responsible to maintain and observe, and to require his Subcontractors to maintain and observe, sound labor practices, and shall require each Subcontractor to take all steps reasonably necessary to avoid labor disputes or stoppages.

6.3.3 Except in the event of emergency, no substantial field operations shall be performed outside of regular working hours without the prior notification of the A/E and the Owner. The Contractor will not be entitled to additional compensation for work performed outside of regular working hours except as otherwise expressly agreed in writing by the Owner prior to the performance of such overtime work. Additional compensation for such authorized overtime shall be limited to the direct cost of the premium portion only of such authorized overtime. No additional indirect cost or fee shall be included.

#### 6.3.4 Substitutions

6.3.4.1 The products, materials and equipment of manufacturers referred to in the Specifications and on the Drawings are intended to establish the standard of quality and design required by the A/E; however, products, materials and equipment manufacturers, other than those specified, may be used, if equivalent and approved in writing by the A/E.

6.3.4.2 It is deemed that the term 'or approved equal' is included after all products, materials and equipment referred to in the Specifications or on the Drawings.

6.3.4.3 The Owner in consultation with the A/E will be the sole judge of equivalency of proposed substitute products, materials, and equipment. The A/E will make written recommendation of acceptance or rejection to the Owner. The Owner will then authorize the A/E to issue to the Contractor written approval or rejection of the substitution.

6.3.4.4 If the Contractor desires to use a substitute item, he shall make application to the A/E in writing in sufficient time (having regard to the progress of the Work, the period of delivery of the goods concerned and adequate time for the Owner's and A/E's review) stating and fully identifying the proposed substitute, cost changes (if any), and submitting substantiating data, sample, brochures, etc. of item proposed. It is the Contractor's responsibility to provide sufficient evidence by tests or other means to support any request for approval of substitution.

6.3.4.5 Prior to proposing any substitute item, the Contractor shall satisfy himself that the item he proposes is, in fact, equal to that specified, that it will fit into the space allocated, that it affords comparable ease of operation, maintenance and service, that its appearance, longevity and suitability for the climate and use are comparable to that specified, and that the substitution is in the Owner's best interest.

6.3.4.6 The burden of proof that a proposed substitution is equal to a specified item shall be upon the Contractor, who shall support his request with sufficient test data and other means to permit the State Engineer and A/E to make a fair and equitable decision on the merits of the proposal. Any item by a manufacturer other than those cited in the Contract Documents, or of brand name or model number or of generic species other than those cited in the Contract Documents will be considered a substitution.

6.3.4.7 Materials and methods proposed as substitutions for specified items shall be supported by certification of their acceptance for use by an authority, person or persons having jurisdiction over the use of the specified material or method.

6.3.4.8 Acceptance of substitutions shall not relieve the Contractor from responsibility for compliance with all the requirements of the Construction Documents. The Contractor shall be responsible at his own expense for any changes in other parts of the work of his Contract or the work of other contractors caused by his substitutions, including cost of all design and redesign services related thereto incurred by the A/E and his consultants.

6.3.4.9 The Contract completion time shall not be extended by any circumstances resulting from a proposed substitution, nor shall the Contractor be entitled to any compensation for any delay caused thereby or related thereto.

6.3.4.10 All costs for the evaluation of proposed substitutions, whether approved or not, shall be borne by the Contractor.

6.3.5 All materials and equipment shall be delivered, handled, stored, installed and protected to prevent damage in accordance with best current practice in the industry, in accordance with manufacturers' specifications and recommendations, and in accordance with Contract Document requirements. The Contractor will store packaged materials and equipment in their original and sealed containers, marked with the brand and manufacturer's name, until ready for use, and deliver materials and equipment in ample time to facilitate inspections and tests prior to installation. The term 'delivery' in reference to any item specified or indicated, means the unloading and storing with proper protection at the project site. Damaged materials or equipment will be rejected and removed from the site by the Contractor.

6.3.6 Before ordering materials, equipment, or performing Work, the Contractor shall verify indicated dimensions. If a discrepancy exists, the Contractor shall notify the A/E of same immediately. The A/E will then clarify the intended design. The Contractor shall take field measurements required for the proper fabrication and installation of the Work. Upon commencement of any item of Work, the Contractor shall be responsible for dimensions related to such item of Work.

#### 6.4 Guarantees/Warranty.

6.4.1 The Contractor guarantees and warrants to the Owner that all materials and equipment furnished under this Contract will be new unless otherwise specified, and that all Work will be of good quality, free from faults and defects and in conformance with the Contract Documents. All Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. If required by the A/E or Owner, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. This guarantee/warranty is not limited by the provisions of Sub-Article 15.2.

6.4.2 The Contractor will indemnify the Owner against loss, including loss of use and lost revenues resulting from a breach of the Contractor's guaranty and warranty under Sub-Article 6.4.1, whether the loss arises before or after the Owner's acceptance of the Project.

6.4.3 Where the contract documents provide for equipment and material warranties in addition to the Contractor's guarantees' and warranty contained in Sub-Article 6.4.1, such warranties shall at a minimum:

6.4.3.1 Provide that the term of the warranty shall start on the date of substantial completion of the project or the date the Owner takes beneficial occupancy of any portion of the project that requires the use or start-up of the warranted equipment or material, whichever date occurs first.

6.4.3.2 Provide for complete repair or replacement of defective equipment or material;

6.4.3.3 Provide all materials, shipping, and labor necessary to repair or replace defective equipment or material at no expense to the Owner;

6.4.3.4 Provide that any replacement parts used in repairing or replacing defective equipment or material shall be new or in a like-new condition.

6.4.3.5 Provide for the complete repair or replacement of defective equipment or material within two weeks after receiving written notice of the defect, provided however, that the Owner can, at its sole discretion, grant an extension of time for good cause shown; and

6.4.3.6 Provide for no limitation of liability should the Contractor and/or manufacturer fail to repair or replace defective equipment or material within the time specified in Sub-Article 6.4.3.4 or should the remedy of repair or replacement otherwise fail.

6.4.3.7 Be construed under South Dakota law.

6.4.3.8 Provide that any legal action brought on the warranty shall be brought only in a South Dakota court.

6.5 Taxes: The Contractor shall pay all sales, consumer, use, excise, and other similar taxes for the Work or portions thereof which are to be provided by the Contractor which are legally enacted at the time bids are received, whether or not yet effective.

6.6 Permits, Fees and Notices.

6.6.1 The Contractor shall secure and pay for all permits and governmental fees, licenses and inspections necessary for the proper execution and completion of the Work which are customarily secured after execution of the Contract and which are legally required at the time the bids are received. The State does not require that inspection and license fees be paid to a municipality for work performed on State property.

6.6.2 The Contractor shall give all notices and comply with all laws, ordinances, rules, regulations and lawful orders of any public authority bearing on the performance of the Work and shall indemnify the Owner and the A/E against all costs, fines and damages, and all actions, claims and proceedings, due to its failure to do so.

6.6.3 The Contractor and its Subcontractors shall acquaint themselves with all codes governing their work and shall complete the work in conformance with all codes governing their work.

6.6.4 It is not the responsibility of the Contractor to make certain that the Contract Documents are in accordance with applicable laws, statutes, building codes and regulations. If the Contractor observes that any of the Contract Documents are at variance therewith in any respect, he shall promptly notify the Owner and the A/E in writing, and any necessary changes shall be accomplished by appropriate modification.

6.6.5 If the Contractor performs any Work knowing it to be contrary to such laws, ordinances, rules and regulations, and without such notice to the Owner and the A/E, he shall assume full responsibility therefor and shall bear all costs attributable thereto.

6.7 Superintendent: The Contractor shall employ a competent superintendent and necessary assistants all of whom are acceptable to the Owner and who shall be in attendance at the Project site during the progress of the Work. The Superintendent shall represent the Contractor and all communications given to the superintendent shall be as binding as if given to the Contractor. Important communications shall be confirmed in writing. Other communications shall be so confirmed on written request in each case. The Superintendent shall not be changed without the Owner's consent.

6.8 Construction Progress Schedule.

6.8.1 The Contractor shall, within 5 days, or within such time as determined by the A/E, after date of Notice to Proceed, prepare and submit to the A/E for approval a reasonable schedule showing the critical path, order in which the Contractor proposes to carry on the work and, the date on which he will start the several salient features (including procurement of materials, plant and equipment). The progress schedule shall indicate appropriately the percentage of work scheduled for completion at any time. If at any time the sequence of work is modified, the Construction Progress Schedule shall be updated.

6.8.2 The Construction Progress Schedule shall reflect the time required for the preparation and processing of shop drawings and submittals and the lead time required in connection with the procurement of manufactured or processed materials and equipment.

6.8.3 The Contractor shall furnish sufficient forces, construction plant, and equipment, and shall work such hours, including night shifts, overtime operations, and Sunday and holiday work, as may be necessary to insure the prosecution of the work in accordance with the approved progress schedule.

6.8.4 Whenever major portions of the Work fall behind the planned schedule, the Owner and A/E shall be notified and advised of action being taken to return the project to its original schedule and such action shall be indicated on the Construction Progress Schedule which shall then be reissued. If, in the opinion of the A/E and Owner, the Contractor is not taking adequate steps to improve or maintain the progress of the work, the A/E and Owner may require him to increase the number of shifts, and/or overtime operations, days of work, and/or the amount of construction plant, all without additional cost to the Owner.

6.9 Documents and Samples at the Site: The Contractor shall maintain at the site for the Owner one record copy of all Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to record all changes made during construction, and approved Shop Drawings, Product Data and Samples. These shall be available to the A/E and Owner and shall be delivered to A/E for the Owner upon completion of the Work.

6.10 Shop Drawings, Product Data and Samples.

6.10.1 Shop Drawings are drawings, diagrams, schedules or other data specially prepared for the Work by the Contractor or any Subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

6.10.2 Product Data are illustrations, standard schedules, performance charts, instructions brochures, diagrams and other information furnished by the Contractor to illustrate a material, product or system for some portion of the Work.

6.10.3 Samples are physical examples which illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

6.10.4 The Contractor shall submit a schedule for submittal of Shop Drawings, Product Data and Samples to the A/E for review. The Contractor shall review, approve and submit to the A/E, with reasonable promptness and in such sequence as to cause no delay in the Work or in the work of the A/E or any separate contractor, all Shop Drawings, Product Data and Samples required by the Contract Documents, in accordance with the schedule reviewed by the A/E.

6.10.4.1 The A/E reserves the right to review Shop Drawings, Product Data, Samples and submittals in a sequence consistent with the sequence of erection, installation and assembly of the various elements of the Work.

6.10.4.2 The Contractor's identification of Shop Drawings, Product Data and Samples shall include verification of information required in Sub-Articles 6.10.9.2 and 6.10.10.2.

6.10.4.3 No extension of time will be granted, nor will any consideration be given to claims arising out of the Contractor's failure to submit any Shop Drawing, Product Data, Samples or related submittals according to the schedule or otherwise in a manner which does not allow adequate lead time for A/E's review, or does not allow ample time for revision, resubmission and subsequent review by the A/E as required.

6.10.4.4 Composite Drawing: In the interest of coordination and expediting the work in critical areas, i.e. exterior wall components, mechanical/electrical systems, and other areas so requested by the A/E, the Contractor shall prepare and submit, to the A/E for review, Composite Drawings embodying the Work of the various trades and/or Subcontractors involved. After review, the Contractor shall distribute prints or reviewed Composite Drawings to affected trades and/or Subcontractors. The Contractor shall require that the involved trades and/or Subcontractors cooperate in preparation of the Composite Drawings to assure proper coordination between trades and/or Subcontractors. The participating trades and/or Subcontractors shall indicate their approval on these drawings.

6.10.5 By approving and submitting Shop Drawings, Product Data and Samples, the Contractor represents that he has determined and verified all materials, field measurement, and field construction criteria related thereto, checked the Shop Drawings, Product Data, and Samples for complete dimensional accuracy; that he has checked to insure that work contiguous with and having bearing on the work shown on the Shop Drawings is accurately and clearly shown, that he has checked the Shop Drawings against the Composite Drawings prepared by the Contractor, that the Work has been coordinated and that the equipment will fit into the assigned spaces, and that he has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Construction Documents.

6.10.5.1 Any Shop Drawing, Product Data or Sample submitted without Contractor's approval will not be processed for review by the A/E, but will be returned to the Contractor for his compliance with the above procedures, in which event it will be deemed that the Contractor has not complied with the provisions herein specified and the Contractor shall bear the risk of all delays as if no Shop Drawing, Product Data and Sample had been submitted.

6.10.5.2 Shop Drawings shall bear a coordination and approval stamp signed by the Contractor and each contiguous Subcontractor, which shall confirm the representations set forth in Sub-Article 6.10.5. Shop Drawings shall bear the seal of a registered professional engineer or A/E when required by the Specifications or State Law.

6.10.6 The Contractor shall not be relieved of responsibility for any deviation from the requirements of the Construction Documents by the A/E's approval of Shop Drawings, Product Data or Samples under Sub-Articles 4.10 and 6.10.9 unless the Contractor has specifically informed the A/E in writing of such deviation at the time of submission and the A/E has given written approval to the specific deviation. The Contractor shall not be relieved from responsibility for errors or omissions in the Shop Drawings, Product Data or Samples by the A/E's approval thereof. Any deviation shall also be indicated on such Shop Drawing, Product Data, Sample, or related submittal by circling or other approved means.

6.10.7 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data or Samples, to revisions other than those requested by the A/E on previous submittals. Unless such written notice has been given, the A/E's Action on a resubmitted Shop Drawing, Product Data, or Sample shall not constitute Review and Action of any changes not requested on the prior submittal.

6.10.8 No portion of the Work requiring submission of a Shop Drawing, Product Data or Sample shall be commenced until the submittal has been approved by the A/E as provided in Sub-Article 6.10.9. All such portions of the Work shall be in accordance with approved submittals.

6.10.8.1 No Shop Drawing, Product Data or Sample shall be issued to the field without the A/E's Action Stamp affixed thereto.

#### 6.10.9 Shop Drawing & Product Data Procedures

6.10.9.1 Shop Drawing Requirements: Shop Drawings shall show design, materials (kind, thickness and finish), dimensions, connections, rough openings, routing details, and other details necessary to insure that they accurately interpret Contract Drawings and Specifications and also show adjoining work in such detail as required to provide proper connection with same. Shop Drawings shall be numbered consecutively and insofar as possible shall be uniform in size.

6.10.9.2 Identification: All Shop Drawings and Product Data shall be identified with the name of the Project, Project Number, building or buildings for which the Shop Drawings and Product Data are being submitted, and shall contain the A/E's name, Contractor's name, Subcontractor's name, date of submittal, drawing number, revision, if any, as well as the Specification Section under which the Work is to be performed and the Drawing and detail numbers that relate to the Shop Drawings and Product Data.

6.10.9.3 Transmittals: All Shop Drawings and Product Data shall be accompanied by a letter of transmittal from the Contractor setting forth the same identification information as required above under Sub-Article 6.10.9.2. Contractor shall number transmittals consecutively in sequence with the sample transmittals and shall indicate the Submittal Procedure number being followed. Transmittal shall also indicate if Shop Drawing is resubmittal and note A/E's file number for original submittal.

6.10.9.4 Submittal Procedures: The Contractor shall submit copies of Shop Drawings and Product Data to the A/E in accordance with the Submittal Procedures listed below.

6.10.9.4.1 Shop Drawings and Product Data shall be sent by the Contractor to the Architect/Engineering team.

6.10.9.4.2 Shop Drawings and Product Data can be sent via an electronic method (email or other electronic platform) or via original paper copy. Contract, Architect/Engineer, and Owner shall agree on submittal method (email, other electronic platform, original paper copy, etc.).

6.10.9.4.3 Shop Drawings and Product Data shall be clearly legible and physical product samples shall be provided whenever necessary.

6.10.9.5 A/E's Distribution & Stamp: Following the A/E's review of each Shop Drawing and Product Data submission, the A/E will retain a copy of the submittal for their records as well as return a copy to the Contractor and Owner with the A/E's stamp and signature affixed thereto, annotated as follows:

6.10.9.5.1 "A Action": "A Action" means the submission is in general conformance with the design concept. Construction, fabrication and/or manufacture can proceed subject to the provision that the Work shall be in accordance with the requirements of the Construction Documents. Final acceptance of the Work shall be contingent upon such compliance.

6.10.9.5.2 "B Action": "B Action" means the submission is in general conformance with the design concept subject to notations by the A/E on the returned Shop Drawings. Construction, fabrication and/or manufacture can proceed subject to the provision that the Work shall be carried out in compliance with all annotations and/or corrections indicated on the returned Shop Drawings and Product Data and in accordance with the requirements of the Construction Documents. Final acceptance of the Work shall be contingent upon such compliance.

6.10.9.5.3 "C Action": "C Action" means that the Contractor shall revise and resubmit the Shop Drawings and Product Data in accordance with all annotations and/or corrections indicated therein. Construction, fabrication and/or manufacture cannot proceed. Shop Drawings and Product Data bearing "C Action" stamp shall not be permitted on the Project Site.

6.10.9.5.4 "D Action": "D Action" means that the submission is rejected for nonconformance with the design concept and the Contractor shall make a new submittal which shall comply with the requirements of the Construction Documents. Construction, fabrication and/or manufacture cannot proceed. Shop Drawings and Product Data bearing "D Action" stamp shall not be permitted on the Project Site.

6.10.9.6 Contractor's Distribution: When transparencies are returned "A Action" or "B Action", the Contractor shall obtain and provide such number of prints to the Subcontractor as may be required by the Subcontractor for his distribution. The Contractor shall have copies of all "A Action" or "B Action" Shop Drawings and Product Data at the Project Site at all times and shall make them available to the A/E's representatives.

6.10.9.7 Cost of Submittal and Distribution: All charges in connection with the delivery of Shop Drawings and Product Data to the A/E shall be paid by the Contractor. All charges in connection with the distribution of Shop Drawings and Product Data to the Contractor shall be paid by the Contractor.

#### 6.10.10 Samples Procedures

6.10.10.1 Sample Requirements: Where possible, all samples required for a particular Specification Section shall be submitted together.



6.10.10.1.1 Samples shall be submitted from the same source which will supply the actual job. Samples shall be of adequate size to show quality, type, color, range, finish, texture and other specified characteristics.

6.10.10.1.2 Samples of materials or products which are normally furnished in containers or packages, which bear descriptive labels and/or application or installation instructions, shall be submitted with such labels and/or instructions.

6.10.10.2 Identification: All Samples shall be labeled, tagged, or otherwise clearly identified. Labels or tags shall set forth the name of the Project, the project number, buildings for which the Sample is being submitted, A/E, Contractor, Subcontractor, and/or supplier, the name of the manufacturer, fabricator, or processor, the trade designation, grade and quality of the material or product, the date of submittal, and specific identification of each sample and a precise reference to the Specification Article and Sub Article wherein the material, product, or element of the Work is specified. Each label or tag shall have sufficient clear space to permit the application of the approval stamp of the Contractor, and the action stamp of the A/E.

6.10.10.3 Transmittals: All samples shall be accompanied by a letter of transmittal from the Contractor setting forth the same identification information as required above under Sub-Article 6.10.4.2. Contractor shall number transmittals consecutively in sequence with the Shop Drawings and Product Data transmittals. Where appropriate, test data and/or manufacturers' certificates shall be referenced in and forwarded with the letter of transmittal. Samples without accompanying certificates or test data will be returned without action.

6.10.10.4 Submittal Procedure: The Contractor shall submit the number of samples as indicated below:

6.10.10.4.1 In the event that a range of variations in texture, graining, color or other characteristics may be anticipated in furnished materials, assemblies, or elements of the Work, a sufficient number of samples of such materials or products shall be submitted to indicate the full range of characteristics which will be present in the materials or products proposed for the Work. Any such materials or products delivered or erected prior to approval of full range samples shall be subject to rejection.

6.10.10.4.2 All Samples shall be submitted in triplicate to the A/E's home office, or where directed by the A/E, except as otherwise set forth in other Sections of the Contract Documents.

6.10.10.5 A/E's Distribution & Stamp: Following the A/E's review of each Sample submission, the A/E will return one set of each submission to the Contractor with the A/E's stamp and signature affixed thereto and annotated in a manner conforming to the convention established in Sub-Article 6.10.9.5.

6.10.10.6 Contractor's Distribution: When Samples are returned 'Action A' or 'Action B', the Contractor shall retain such Samples in a suitable place at the Project Site for use by the Contractor, his Subcontractors, the A/E and his authorized representatives to insure that all work is being installed in accordance with these Samples. The remaining Samples will be retained by the A/E.

6.10.10.7 Cost of Submittal and Distribution: All charges in connection with the delivery of Samples to the A/E's home office or where directed by A/E (and all charges in connection with the subsequent distribution thereof by the A/E) shall be paid by the Contractor.

## 6.11 Use of Site.

6.11.1 The Contractor shall confine operations at the Site to areas permitted by law, ordinances, permits and the Contract Documents and shall not unreasonably encumber the Site with any unnecessary or surplus materials or equipment or debris.

6.11.2 Notwithstanding the designation of construction limits or the indication of temporary fences or barricades, the provisions of the Contract Documents governing certain portions or phases of the Work may require that certain operations be carried out beyond such designated limits. Trenching, utility work, site development, landscaping and all other work, if required beyond such designated limits, shall be scheduled in such a manner as to cause or occasion a minimum of inconvenience or disturbance or interference with the normal operation of the Owner, abutters, and the public. The Contractor shall obtain the Owner's prior approval for such operations, prosecute such operations expeditiously and restore the affected area and other areas needed for access to their original condition immediately upon completion of such operations, unless otherwise specified herein.

6.11.3 All operations, including pumping, draining and control of surface and ground water shall be carried out so as to avoid endangering the Work of any adjacent facility or property, or interrupting, restricting or otherwise infringing or interfering with the use thereof.

6.11.4 The Contractor shall confine operations at the site to work related activities. The Contractor shall not use the site for lodging or as a personal residence.

## 6.12 Cutting and Patching of Work.

6.12.1 The Contractor shall be responsible for all cutting, fitting or patching that may be required to complete the Work or to make its several parts fit together properly.

6.12.2 The Contractor shall not damage or endanger any portion of the Work or the work of the Owner or any separate contractors or adjacent facilities by cutting, patching or otherwise altering any work, or by excavation. The Contractor shall not cut or otherwise alter the work of the Owner or any separate contractor except with the written consent of the Owner and of such separate contractor. The Contractor shall not unreasonably withhold from the Owner or any separate contractor his consent to cutting or otherwise altering the Work.

6.12.3 Structural elements of the Work shall not be cut, patched or otherwise altered or repaired without prior written authorization by the A/E.

6.12.4 Authorization to proceed with remedial operations for any damaged or defective element or portion of the Work shall not constitute a limitation or a waiver of the A/E's right to require the removal and replacement of any work which fails to fulfill the requirements of the Contract Documents.

## 6.13 Cleaning Up.

6.13.1 The Contractor at all times shall keep the Site and related streets free from accumulation of waste materials or rubbish caused by his operations. At the completion of the Work he shall remove all his waste materials and rubbish from and about the Project as well as his tools, construction equipment, machinery and surplus materials. All waste and rubbish shall be removed from the Site at least weekly and more often if necessary.

6.13.2 If the Contractor fails to maintain a clean and safe Project and/or fails to clean up at the completion of the Work, the Owner may do so as provided in Sub-Article 5.3 and the cost thereof shall be charged to the Contractor.

6.14 Communications: Except where otherwise directed by the A/E or otherwise provided in the Contract Documents, the Contractor shall forward all communications to the Owner through the A/E.

6.15 Royalties and Patents: The Contractor shall pay all royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and shall save the Owner harmless from loss on account thereof, except that the Owner shall be responsible for all such loss when a particular manufacturer or manufacturers is specified, but if the Contractor has reason to believe that the design, process or product specified is an infringement of a patent, he shall be responsible for such loss unless he promptly gives such information to the A/E and Owner in writing.

6.16 Indemnification.

6.16.1 To the fullest extent permitted by law, the Contractor shall indemnify, defend and hold harmless the Owner, the A/E and its consulting engineers, and their respective successors, agents and employees from and against all claims, damages, liabilities, losses and expenses, including but not limited to attorney's fees, arising out of or resulting from the performance of the Work, provided that any such claim, damage, loss or expense (1) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (including the Work itself) including the loss of use resulting therefrom, and (2) is caused in whole or in part by any tortious act or omission of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder. Such obligations shall not be construed to negate, abridge or otherwise reduce any other right or obligation or indemnity which would otherwise exist as to any party or person described in this Sub-Article 6.16.

6.16.2 In any and all claims against the Owner, the A/E or any of its consultants, and their respective successors, agents or employees by any employee of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation under this Article 6.16 shall not be limited in any way by any limitation on the amount or type of damages, compensations or benefits payable by or for the Contractor or any Subcontractor under workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts.

6.16.3 The obligations of the Contractor under this Sub-Article 6.16 shall not extend to indemnification of the A/E or other design consultants employed by him, his consultant, agents or employees for damages, claims, losses or expenses arising out of: (a) the preparation or approval by the A/E or his design consultants of maps, drawings, opinions, reports, Change Orders, designs or specifications, or (b) the giving of or the failure to give directions or instructions by the A/E or his design consultants provided such giving or failure to give is the primary cause of the damage, claim, loss or expense.

6.16.4 The Contractor agrees to defend, indemnify and save the Owner, and A/E, or any of its consulting engineers, and their respective successors, agents or employees harmless from all costs, liabilities, damages or expenses, including reasonable attorneys' fees, incurred by them, by virtue of any claim or claims whatsoever filed by any Subcontractor, Sub-subcontractor, mechanic, laborer or materialman making claims arising from the Work by, through, or under the Contractor. The Contractor also hereby agrees to defend, indemnify and hold harmless, protect, and defend the Owner, the A/E and its consulting engineers, and their respective successors, agents or employees from and against any liability, claim, judgment, loss, damage, including but not limited to direct, indirect and incidental and consequential damages, attorneys fees, court costs and expense of collection, occasioned in whole or in part by the failure of the Contractor, its Subcontractor, or Sub-subcontractors to comply with any of the terms or provisions of the Contract Documents.

6.16.5 This article does not require the Contractor to indemnify the Owner, its officers, agents, or employees from claims or liability arising solely from the acts or omissions of the Owner, its officers, agents, or employees.

## 6.17 Default.

6.17.1 The Contractor shall be in default of the Contract if:

6.17.1.1 Contractor refuses or fails to prosecute the Work in accordance with the Contract Documents in any material respect;

6.17.1.2 Contractor fails to make proper payment to Subcontractors or for materials or labor (provided Owner shall have paid to Contractor any payments due from Owner in connection with such materials or labor);

6.17.1.3 Contractor disregards laws, ordinances, rules, building codes and regulations or orders of any public authority having jurisdiction;

6.17.1.4 Contractor fails to coordinate its work with other contractors and Subcontractors as required under Article 8 of these General Conditions;

6.17.1.5 Contractor fails to comply with the scheduling requirements of the Contract;

6.17.1.6 Contractor fails to promptly replace rejected material or correct rejected workmanship;  
or

6.17.1.7 Contractor fails in any material respect to observe any other terms, provisions, conditions, covenants and agreements in the Contract to be observed and performed on the part of the Contractor.

6.17.2 In the event of any default by Contractor under the Contract, Owner shall have the right to take such measures as it deems necessary to correct the default, at the Contractor's sole cost and expense and to deduct such costs, including but not limited to the State Engineer's and A/E's fees, as it may incur from amount otherwise owing to the Contractor, or to terminate the Contract in accordance with Sub-Article 16.2 of the General Conditions in addition to any and all other remedies that Owner may now or hereafter have. If the amounts owing to the Contractor are insufficient to cover the Owner's cost of corrections, the Contractor shall pay such amount promptly upon demand.

**Article 7**  
**SUBCONTRACTORS**

7.1 Definitions.

7.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform any of the Work at the site. The term Subcontractor is referred to throughout the Contract Documents as if singular in number and masculine in gender and means a Subcontractor or his authorized representative. The term Subcontractor does not include any separate contractor or his subcontractors.

7.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform any of the Work at the site. The term Sub-subcontractor is referred to throughout the Contract Documents as if singular in number and masculine in gender and means a Sub-subcontractor or an authorized representative thereof.

7.2 Award of Subcontracts and Other Contracts for Portions of the Work. The Contractor shall conduct an investigation of each of its proposed Subcontractor's capabilities to assure each is responsible and has the requisite experience, skill, physical plant, and financial strength necessary to perform each Subcontractor's respective Work. The Contractor shall not contract with any Subcontractor that is not responsible or does not have the requisite experience, skill, physical plant, and financial strength necessary to perform its part of the Work.

7.3 Subcontractual Relations.

7.3.1 The Contractor shall not include any provisions in its Contracts with its Subcontractors which will in any way prejudice the rights of the Owner and the Architect/Engineer under the Contract between the Owner and the Contractor.

7.3.2 The Subcontract agreement shall require the Subcontractor to consent to any assignment of the Subcontract to the Owner in the event of a default by the Contractor hereunder.

7.3.3 Nothing in Article 7 shall be construed to create a privity of Contract between the Owner and any Subcontractor.

**Article 8**  
**WORK BY OWNER OR BY SEPARATE CONTRACTORS**

8.1 Owner's Right to Perform Work and to Award Separate Contracts.

8.1.1 The Owner reserves the right to perform work related to the Project with his own forces, and to award separate contracts in connection with such work. Such work may include Work assigned to the Contractor under the Contract Documents which Work is not being performed properly or in accordance with the scheduling provisions of the Contract Documents, whether or not the Contractor is in default under Sub-Article 6.17 and whether or not the Owner has terminated the Contract under Sub-Article 16.2. If the Owner elects to exercise this right it will do so upon reasonable notice to the Contractor. There shall be an appropriate adjustment in amounts payable to the Contractor to reflect the Work undertaken by the Owner, which the parties shall confirm by Change Order in accordance with Article 14. If the Contractor claims that delay is involved because of such action by the Owner, he shall make such claim as provided elsewhere in the Contract Documents.

8.1.2 When separate contracts are awarded for different portions of the Project or other work on the site, the term Contractor in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

8.1.3 The Owner will provide for the coordination of the work, of his own forces and of each separate contractor with the Work of the Contractor, who shall cooperate therewith as provided in Sub-Article 8.2.

8.2 Mutual Responsibility.

8.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity and all required facilities for the introduction and storage of their materials and equipment and the execution of their work, and shall connect and coordinate his Work with theirs as required by the Contract Documents.

8.2.2 If any part of the Contractor's Work depends for proper execution or results upon the work of the Owner or any separate contractor, the Contractor shall, prior to proceeding with the Work, promptly report to the A/E any apparent discrepancies or defects in such other work that render it unsuitable for such proper execution and results. Failure of the Contractor to report shall constitute an acceptance of the Owner's or separate contractor's work as fit and proper to receive his Work, except as to defects which may subsequently become apparent in such work by others.

8.2.3 Any costs caused by defective or ill-timed work shall be borne by the party responsible therefor.

8.2.4 Should the Contractor wrongfully cause damage to the work or property of the Owner or of a separate Contractor, or to other work on the site, the Contractor shall promptly remedy such damage as provided in Sub-Article 12.2.5.

8.2.5 Should the Contractor wrongfully cause damage to the work or property of any separate contractor, the Contractor shall upon due notice promptly attempt to settle with such other contractor by agreement, or otherwise to resolve the dispute. If such separate contractor sues or initiates a litigation proceeding against the Owner on account of any damage alleged to have been caused by the Contractor, the Owner shall notify the Contractor who shall participate in the defense of such proceedings at the Contractor's expense, and if any judgment or award against the Owner arises therefrom the Contractor shall pay or satisfy it and shall reimburse the Owner for all attorneys' fees and court costs which the Owner has incurred.

8.3 Owner's Right to Clean Up: If a dispute arises between the Contractor and separate contractors as to their responsibility for cleaning up the Project, the Site and related streets and walks on a routine basis as required by Sub-Article 6.13, the Owner may clean up and charge the cost thereof to the contractors responsible therefore as the Owner shall determine to be just.

**Article 9**  
**MISCELLANEOUS PROVISIONS**

9.1 Governing Law: The Contract shall be governed by South Dakota Law.

9.2 Successors and Assigns: The Owner and the Contractor each binds himself, his successors, assigns and legal representatives to the other party hereto and to the successors, assigns and legal representatives of such other party in respect to all covenants, agreements and obligations contained in the Contract Documents. The Contractor shall not assign the Contract or sublet it as a whole without the written consent of the Owner, nor shall the Contractor assign any money due or to become due to him hereunder, without the previous written consent of the Owner.

9.3 Written Notice: All notices, demands and other communications hereunder shall be in writing and shall be deemed to have been given if sent pursuant to Article VII of the Agreement for Construction.

9.4 Claims for Damages: Should either party to the Contract suffer injury or damage because of any act or omission of the other party or of any of his employees, agents or others for whose acts he is legally liable, claim shall be made in writing to such other party within 14 days after the first observance of such injury or damage.

9.5 Performance and Labor and Material Payment Bond: Before commencing the Work, the Contractor shall provide a Performance and Labor and Material Payment Bond in accordance with the requirements of the Instructions to Bidders.

9.6 Rights and Remedies.

9.6.1 The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law. This provision relates particularly to the Contractor's obligations under Sub-Article 15.2.2.

9.6.2 No action or failure to act by the Owner, A/E or Contractor shall constitute a waiver of any right or duty afforded any of them under the Contract, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach thereunder, except as may be specifically agreed in writing.

9.7 Tests.

9.7.1 If the Construction Documents, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any portion of the Work to be inspected, tested or approved, the Contractor shall give the A/E and Owner timely notice of its readiness so the A/E and Owner may observe such inspection, testing or approval. The Contractor shall perform and bear all costs of such inspections, tests and approvals, unless otherwise provided.

9.7.1.1 Where certain testing and inspection requirements are set forth in the various Sections of the Construction Documents to be performed at the expense of the Owner, the Owner will retain the services of testing laboratories, agencies, or consultants, to perform such tests or inspections and render such services as may be required to verify that the work fulfills the requirements and intent of the Construction Documents. Such services will be performed in a manner consistent with the requirements of the Owner and the various agencies having jurisdiction over the Work and in accordance with reasonable standards of architectural and engineering practice.



9.7.1.2 The Owner reserves the right to modify the scope of or to re-allocate any of the testing and inspection services specified in the various Sections of the Construction Documents to be performed by a testing laboratory, agency or consultant retained by the Owner in connection with the Work when it can be satisfactorily established that such adjustment in scope is consistent with the intent of the Construction Documents. In the event that the Contractor shall not concur with such modification of scope or re-allocation of such services, he shall immediately notify the A/E and Owner in writing.

9.7.2 If the A/E determines that any Work requires special inspection, testing, or approval which Sub-Article 9.7.1 does not include, he will upon written authorization from the Owner, order the performance of such services by qualified independent testing laboratories, agencies or consultants as may reasonably be required or instruct the Contractor to order such special inspection, testing or approval, and the Contractor shall give notice as provided in Sub-Article 9.7.1. If such special inspection or testing reveals a failure of the Work to comply with the requirements of the Construction Documents, the Contractor shall bear all costs thereof, including the cost of the tests, correction of the Work, the cost of retesting, and compensation for the A/E's additional services made necessary by such failure; otherwise the Owner shall bear such costs, and an appropriate Change Order shall be issued.

9.7.2.1 If A/E's observation or any inspection or testing undertaken pursuant to Sub-Article 9.7 reveals a failure in any one of a number of identical or similar items or elements incorporated in the Work to comply with (1) the requirements of the Construction Documents or, (2) with respect to the Performance of the Work, with laws, ordinances, rules, regulations, building codes or orders of any public authority having jurisdiction, the A/E will have the authority to order inspection and/or testing of all such items or elements of the Work, or of a representative number of such items or elements of the Work, as he may in his reasonable opinion consider necessary or advisable, and the Contractor shall bear all costs thereof, including the cost of the tests, correction of the Work, the cost of retesting, and the A/E's additional services, if any are required, made necessary thereby. However, neither the A/E's authority to act under Sub-Article 9.7 nor any decision made by him in good faith either to exercise or not to exercise such authority, shall give rise to any duty or responsibility of the A/E to the Contractor, any Subcontractor, any of their agents or employees, or any other person performing any of the Work.

9.7.3 Required certificates of inspection, testing or approval shall be secured by the Contractor and promptly delivered by him to the A/E and the Owner.

9.7.3.1 The Contractor shall obtain and deliver promptly to the Owner any certificates of final inspection of any part of his Work or operating permits for any mechanical or electrical apparatus, such as elevators, escalators, boilers, air compressors, fire alarms, etc., which may be required by law to permit full use and occupancy of the premises by the Owner. Except as is otherwise provided in Sub-Article 10.1.3, receipt of such permits or certificates by the Owner shall be a condition precedent to Completion of the Work.

9.7.3.2 Copies of reports issued as a result of services performed at the expense of the Owner pursuant to the provisions of this Article will be distributed to all parties to the Contract.

9.7.4 If the A/E or owner is to observe the inspections, tests or approvals required by the Contract Documents, they will do so promptly and, where practicable, at the source of supply.

9.7.5 In connection with testing and inspection services performed at the expense of the Owner, the Contractor shall provide Samples of materials and/or elements of the Work required as test specimens and shall provide incidental labor and facilities at the site reasonably required in support of such services.

9.7.6 The cost of testing services required solely for the convenience of the Contractor in his scheduling and performance of the Work shall be borne by the Contractor.

9.7.7 The cost of testing services related to remedial operations performed to correct deficiencies in the Work shall be borne by the Contractor.

9.7.8 If, during the course of the performance of any testing, inspection, control, balancing, adjusting, or similar work by the Contractor or an agent of the Contractor, it is the opinion of the A/E that the Contractor or said agent has failed to perform such work in a satisfactory manner, the Contractor shall, at his own expense, retain the services of a service organization which is satisfactory to the A/E for the performance of such work.

## 9.8 Litigation.

9.8.1 Unless otherwise specifically provided in this Agreement, all claims, counter-claims, disputes or other matters in question between the Owner and the Contractor arising out of, or relating to this Agreement, or the breach thereof, will be decided by direct negotiations, by non-binding mediation if the parties mutually agree, or in a circuit court of competent jurisdiction within the State of South Dakota. Notice of a request for mediation shall be sent in writing to the other party to this Agreement within a reasonable time after the claim, dispute, or other matter in question has arisen. If the party receiving notice of request does not agree to mediation in writing within 10 calendar days, it will be deemed that the parties do not mutually agree to mediate the matter. If the parties agree to mediate, a mediator to hear the dispute will be agreed upon by the parties. If agreement on a mediator cannot be reached, the State shall select the mediator.

9.8.2 The Contractor shall carry on the Work and maintain its progress during any dispute or litigation proceedings, and the Owner shall continue to make payments to the Contractor to the extent required by the Contract Documents and South Dakota Law.

**Article 10**  
**TIME**

10.1 Definitions.

10.1.1 The Contract Time is the period of time allotted in the Construction Contract for Substantial Completion of the Work as defined in Sub-Article 10.1.3, including authorized adjustments thereto.

10.1.2 The date of commencement of the Work is the date established in the Notice to Proceed.

10.1.3 The date of Substantial Completion of the Work is the date certified by the A/E when construction is sufficiently completed in accordance with the Contract Documents so that the Owner can occupy and utilize the Project for the use for which it is intended, and such Work is fully completed in accordance with the Contract Documents except for minor items, adjustments or corrections which have no material effect upon the utilization, function or intrinsic values of the entire Project, including all of its mechanical, electrical and other systems and facilities.

10.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically designated.

10.2 Progress and Completion.

10.2.1 All time limits stated in the Contract Documents, including the Construction Completion Schedule, are of the essence of the Contract.

10.2.2 The Contractor shall begin the Work on the date of commencement as defined in Sub-Article 10.1.2. He shall carry the Work forward expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

10.3 Delays and Extensions of Time.

10.3.1 If the Contractor is delayed at any time in the progress of the Work by any act or neglect of the Owner or the A/E, or by any employee of either, or by changes in the Construction Completion Schedule required by the Owner, or by any separate contractor employed by the Owner, or by changes ordered in the Work, or by labor disputes not caused by the labor practices of the Contractor or any Subcontractor in contravention of applicable labor practices, fire, unusual delay in transportation, severe and unusual weather conditions not reasonably anticipatable, unavoidable casualties, or any other causes beyond the Contractor's control and not occurring due to the fault or neglect of the Contractor, any Subcontractor or any other person for whose acts the Contractor is responsible, then the Contract Time shall be extended by Change Order for such reasonable time as the Owner shall determine, or the Owner may elect to require the Contractor to accelerate the Work, in which case the Contract Sum shall be increased by a Change Order in the amount of the direct cost to the Contractor (exclusive of overhead and profit of necessary over-time labor).

10.3.2 Any claim for extension of time shall be made in writing to the Owner with a copy to A/E not more than 10 days after the commencement of the delay; otherwise it shall be waived. In the case of continuing delay only one claim is necessary. The Contractor shall provide an estimate of the probable effect on such delay on the progress of the Work.

10.3.2.1 Such claims shall set forth in detail the nature of the circumstances which form the basis for each such claim, the date upon which each such alleged cause of delay began, or began to affect the timely prosecution of the Work, and ended, or ceased to have an adverse effect upon the timely prosecution of the Work, and the number of days extension of time requested as a consequence of each such alleged cause of delay. The Contractor shall provide such supporting documentation as the Owner may require, including, where appropriate, a revised Construction Completion Schedule indicating all of the activities affected by the circumstances which form the basis for the claim.

10.3.2.2 The Contractor shall not be entitled to a separate extension of time as a consequence of each one of a number of causes of delay which may have a concurrent or interrelated effect on the progress of the Work.

10.3.2.3 The Owner shall have the right to defer his decision or decisions with reference to any claim or claims for an extension of time made pursuant to the provisions of this Article until the facts or circumstances which form the basis for such claim or claims may be fully assessed to the Owner's reasonable satisfaction.

10.3.2.4 Notwithstanding the provisions of Sub-Article 10.3.2, claims for an extension of time arising out of authorized changes in the Work shall be made in writing prior to or concurrent with the submission of the Contractor's proposal pursuant to such change. No extension of time arising out of changes in the Work will be granted subsequent to the date upon which the Contractor is authorized to proceed with such change or changes in the Work unless specific provisions governing a subsequent determination of an extension of time have been incorporated in such authorization to proceed with such change or changes in the Work. No claim for damages or separate compensation for delay arising from such change in the Work shall be recognized or be deemed valid, it being understood that any additional cost to the Contractor arising from such change shall be included in the amended Contract Sum set forth in such Change Order.

10.3.2.5 Time extensions will not be granted for rain, wind, snow, or other natural phenomena of normal intensity for the locality where work is performed. Determinations of the extent of delay attributable to unusual weather phenomena shall be made by comparing the weather for the contract period involved with the average of the preceding five (5) year climactic range during the same period on the calendar. National Oceanic and Atmospheric Administration National Weather Service statistics for the locality or area where the work is performed shall be used to determine the five (5) year average weather conditions. Time extensions for weather delays do not entitle the Contractor to "extended overhead" recovery.

10.3.3 If no agreement is made stating the dates upon which interpretations as provided in Sub-Article 4.13 shall be furnished, then no claim for delay shall be allowed on account of failure to furnish such interpretations until 15 days after written request is made for them, and not then unless such claim is reasonable.

10.3.4 Should the contractor fail to substantially complete the work within the time agreed upon in the contract documents, or within such extra time as may have been allowed by increases in the contract or by formally approved extensions granted by the owner, the contractor and the contractor's surety shall be liable for and shall pay the owner the sums stipulated in the agreement for construction as liquidated damages for each calendar day of delay until the work is substantially complete. This sum is not a penalty but is liquidated damages due the owner from the contractor by reason of inconvenience to the public, added cost of engineering and supervision, and other items which have caused an expenditure of public funds resulting from the contractor's failure to complete the work within the time specified in the contract. In addition to liquidated damages, if any delay on the part of the contractor, any subcontractor or sub-subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable results in any claim by third parties against the owner or the A/E arising out of such delay, the contractor shall pay, satisfy, and discharge all losses, damages and expenses arising out of such claims, including attorneys' fees, and shall indemnify and hold harmless the owner and the A/E and their agents and employees from and against all costs, fees, losses, damages, and expenses arising out of such claims enforced against the owner or the A/E.

10.3.5 No extension of time will be granted to the Contractor for any delay other than those described in Sub-Article 10.3.1.

10.3.5.1 Should the Contractor fail, refuse or neglect to supply a sufficiency of workmen or to deliver the materials with such promptness as to prevent delay in the progress of the Work, or fail in any material respect diligently to commence and prosecute the Work and to proceed in accordance with the approved construction schedule, or if the different parts thereof are not commenced, prosecuted, finished, delivered or installed in such manner as will insure substantial completion in accordance with the approved Construction Completion Schedule, or if the Contractor shall fail in the performance of any of his obligations under this Contract in any material respect, the Owner shall have the right to direct the Contractor, upon 3 days notice at the Contractor's cost and expense, to furnish such additional labor and to expedite deliveries of materials (or the Owner may furnish such labor and expedite such deliveries at the cost of the Contractor), which labor or expediting shall, in the Owner's opinion, be sufficient to speed up and complete the Work in accordance with the Construction Completion Schedule.

10.3.5.2 If such additional labor shall not be available, the Owner shall have the right to direct the Contractor at the latter's own cost and expense, to work overtime to such an extent as will be sufficient, in the Owner's opinion, to speed up and complete the Work as herein provided.

10.3.6 The Contractor's right to make a claim or claims for an extension of time, as provided in Sub-Article 10.3.1, shall not preclude the Contractor's right to make a claim for delay damages arising out of the Owner's significant interference, by action or inaction, with the Contractor's Work.

#### 10.4 Beneficial Occupancy.

10.4.1 The Owner shall have the privilege of Beneficial Occupancy and the use and benefit of designated areas, subdivisions or portions of the Project prior to completion and acceptance of the entire Project, provided that such Beneficial Occupancy shall not unduly interfere with the Contractor's operations nor unduly delay him in completing the entire Work. Such occupancy and use shall be further subject to the provisions set forth herein and the provisions of SDCL § 5-18B-13.

10.4.2 In the event that the Owner desires to exercise the privilege of Beneficial Occupancy, he shall give reasonable notice to the A/E and the Contractor. If the A/E determines that such proposed occupancy is reasonable and proper, the Contractor shall cooperate with the Owner in providing services and facilities reasonably required for the health, safety and comfort of the occupants and other parties lawfully present and/or entering or leaving the premises. Mutually acceptable arrangements shall be made between the Owner and the Contractor with regard to procedures, terms and conditions governing the operation and maintenance of such services and facilities as may be utilized for the benefit of the Owner. The Owner will assume proportionate and reasonable responsibility for operation of systems, equipment and/or utilities required to provide such services, in part or in total, including proportionate and reasonable expenses of operation incidental thereto. No such Beneficial Occupancy shall accelerate the commencement of any warranty period on any system but only on the particular components being utilized.

10.4.3 The Owner's Beneficial Occupancy or use of such designated areas, subdivisions, or portion of the Work shall not constitute acceptance of systems, materials, or elements of the Work which are not in accordance with the requirements of the Contract Documents; nor relieve the Contractor from his obligations to complete the Work; nor for responsibility for loss or damage due to or arising out of defects in, or malfunctioning of, systems, materials, equipment, or elements of the Work; nor from other unfulfilled obligations or responsibilities of the Contractor under the Contract. If, however, damage results solely from any act of the Owner, the Owner will assume its proportionate responsibility for such damage.

**Article 11**  
**PAYMENTS AND COMPLETION**

11.1 Contract Sum: The Contract Sum is stated in the Agreement for Construction.

11.2 Schedule of Values: Before the first Application for Payment, the Contractor shall submit to the Owner and A/E a schedule of values allocated to the various portions of the Work, prepared in such form and supported by such data to substantiate its accuracy as the Owner and A/E may require. The format and number of copies of such Applications for Payment shall be as directed by the Owner and the A/E. This schedule, unless objected to by the Owner, shall be used as a basis for the Contractor's Applications for Payment.

11.3 Monthly Application for Payment.

11.3.1 No later than the 5th day of each month the Contractor shall submit to the A/E his monthly itemized application for Payment. The Contractor shall not submit more than one pay application per month. The monthly Application for Payment shall be on AIA Document G702 and supported by such data substantiating the Contractor's right to partial payment as the Owner or A/E may require; including but not limited to receipts, releases, and waivers of liens.

11.3.1.1 In applying for payment, the Contractor shall submit his monthly payment estimate based upon the approved schedule of work for the project, itemized in such form and supported by such evidence as will show his right to the payment claimed. Claims made on account of materials delivered and suitably stored at the site, but not incorporated in the work, shall be conditioned upon submission by the Contractor of Bills of Sale or such other procedure as will establish the Owner's title to such material or otherwise adequately protect the Owner's interest.

11.3.1.2 If the Contractor chooses to apply for payment for materials which cannot be incorporated into the Work, and cannot be stored on the site, he may do so provided the following conditions are met:

Unless otherwise agreed to by the Owner, the material shall be stored in a bonded or insured commercial warehouse within a geographic radius of 15 miles of the construction site, with the Owner being listed on the bond or insurance certificate as the sole beneficiary in the case of loss or damage to the stored materials. The Contractor shall be responsible for all storage, insurance or transportation costs associated with the materials. Conditions of insurance will apply to applicable portions of Sub-Article 11.3.1.2. Contractor shall provide the Owner with bills of sale or such other documents as will establish the ownership of the materials.

11.3.2 The Contractor warrants that title to all Work, materials and equipment covered by an Application for Payment will pass to the Owner either by incorporation in the construction or upon the receipt of payment by the Contractor, whichever occurs first, free and clear of all liens, claims, security interests or encumbrances, hereinafter referred to in this Article as "liens"; and that no Work, materials or equipment covered by an Application for Payment will have been acquired by the Contractor, or by any other person performing Work at the site or furnishing materials and equipment for the Project, subject to an agreement under which an interest therein or an encumbrance thereon is retained by the seller or otherwise imposed by the Contractor or such other person.

11.3.3 Monthly applications received after the 5th day of the month will be treated as if submitted on the 5th day of the following month.

11.4 Recommendation for Payment.

11.4.1 By the 15th of each month, the A/E will review the Contractors Monthly Application for Payment and make his certification to the Owner with a copy to the Contractor, for such amount as the A/E believes is properly due, or notify the Contractor in writing his reasons for withholding a Certificate as provided in Sub-Article 11.6.1.

11.4.2 The issuance of a Certification for Payment will constitute a representation by the A/E to the Owner, based on his observations at the site as provided in Sub-Article 4.3 and the data comprising the Monthly Application for Payment, that the Work has progressed to the point indicated; that, to the best of his knowledge, information and belief, the quality of the Work is in accordance with the Contract Documents (subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to the result of any subsequent tests required by or performed under the Contract Documents, to minor deviations from the Contract Documents correctable prior to completion, and to any specific qualifications stated in his Certificate); and that the A/E believes that the Contractor is entitled to payment in the amount recommended. However, by issuing a Certification for Payment, the A/E shall not thereby be deemed to represent that he has made exhaustive or continuous on-site inspections to check the quality or quantity of the Work or that he has reviewed the construction means, methods, techniques, sequences or procedures, or that he has made any examination to ascertain how or for what purpose the Contractor has used the moneys previously paid on account of the Contract Sum. The Owner will not be bound by the amount stated in the A/E's Certification for Payment in making determinations of amounts properly payable to the Contractor.

## 11.5 Progress Payments.

11.5.1 Based upon his review of the Monthly Application for Payment, and the A/Es Certification, the Owner shall make progress payments to the Contractor in such amounts as the Owner reasonably determines are properly due less the aggregate of previous payments in each case. Payment of amounts determined to be due by the Owner under each Monthly Application for Payment shall be due to the Contractor 20 days after the 15th of each month. unless the A/E's certification was delayed by following the procedures of Article 11.6.1. In such case, payment shall be 25 days after the 15th of each month. The Owner shall at all times retain an amount sufficient to complete the Work pursuant to SDCL §§ 5-18B-11 and 5-18B-13. If the Owner retains any portion of a certified progress payment that is properly due and undisputed beyond the time for payment specified herein and for reasons other than those required by statute, the Owner shall owe and pay the Contractor four percent (4%) interest compounded annually on the retained amount starting from the date payment first becomes due under this article.

11.5.2 The Contractor shall promptly pay each Subcontractor, upon receipt of payment from the Owner, out of the amount paid to the Contractor on account of such Subcontractor's Work, the amount to which said Subcontractor is entitled reflecting any amounts actually withheld, if any, from payments to the Contractor on account of such Subcontractor's Work. The Contractor shall not withhold retainage from its Subcontractors unless retainage is withheld from the Contractor by the Owner. The Contractor shall, by an appropriate agreement with each Subcontractor, require each Subcontractor to make payments to his Sub-subcontractors in similar manner.

11.5.3 The Owner shall, on request, furnish to any Subcontractor, if practicable, information regarding the percentages of completion or the amounts applied for by the Contractor and the action taken thereon by the Owner on account of Work done by such Subcontractor.

11.5.4 Neither the Owner nor the A/E shall have any obligation to pay or to see to the payment of any moneys to any Subcontractor except as may otherwise be required by law.



11.5.5 No Certification for Payment, nor any progress payment, nor any partial or entire use or occupancy of the Project by the Owner, shall constitute acceptance or approval of any Work not in accordance with the Contract Documents.

## 11.6 Payments Withheld.

11.6.1 The A/E may decline to certify the full payment of the amount requested by the Contractor in his monthly application to the extent necessary to reasonably protect the Owner. If the A/E is unable to certify payment in the amount of the Application, he will, within 10 days after receipt of the monthly application, notify the Contractor in writing the reasons he cannot make such a certification. If the Contractor and the A/E cannot agree on a revised amount within five days of A/E sending written notice, the A/E will promptly issue a Certification for Payment for the amount for which he is able to certify to the Owner pursuant to Sub-Article 11.4.2. The A/E may also decline to certify payment because of subsequently discovered evidence or subsequent observations, he may nullify the whole or any part of any Certification for Payment previously issued, and the Owner may withhold payment of all or any part of an Application for Payment, to such extent as may be necessary to protect the Owner from loss because of:

11.6.1.1 Defective work not remedied;

11.6.1.2 Third party claims filed or reasonable evidence indicating probable filing of such claims;

11.6.1.3 Failure of the Contractor to make payments properly to subcontractors or for labor, materials or equipment;

11.6.1.4 Reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

11.6.1.5 Damage to the Owner or another contractor;

11.6.1.6 Reasonable evidence that the Work will not be completed within the Contract Time;

11.6.1.7 Failure to carry out the Work in accordance with the Contract Documents;

11.6.1.8 A lien or attachment is filed and such lien is not discharged within 5 days of demand from the Owner;

11.6.1.9 Failure of the Contractor and/or of the Mechanical or Electrical Subcontractors to comply with the mandatory requirements for maintaining "up-to-date" Record Drawings;

11.6.1.10 Incomplete or otherwise inadequate Application for Payment; or

11.6.1.11 Reasonable evidence that the Contractor is in material breach of his obligations under the Contract.

11.6.2 When the above grounds in Sub Article 11.6.1 are removed, payment shall be made for amounts withheld because of them.

## 11.7 Substantial Completion.

11.7.1 When the Contractor considers that the Work, or a designated portion thereof which is acceptable to the Owner, is Substantially Complete as defined in Sub Article 10.1.3 the Contractor shall prepare for submission to the A/E and Owner a list of items to be completed or corrected. The failure to include any item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. When the A/E and Owner on the basis of an inspection determines that the Work or designated portion thereof is Substantially Complete, the A/E will then prepare a Certificate of Substantial Completion which shall establish the Date of Substantial Completion, shall state the responsibilities of the Owner and the Contractor for security, maintenance, heat, utilities and damage to the Work, and shall fix the time within which the Contractor shall complete the items listed therein. Warranties and Guarantees required by the Contract Documents shall commence on the Date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion. The Certificate of Substantial Completion shall be submitted to the Owner and the Contractor for their written acceptance of the responsibilities assigned to them in such Certificate.

11.7.2 Upon Substantial Completion of the Work or designated portion thereof and upon application by the Contractor and certification by the A/E, the Owner shall make payment, reflecting adjustment for defective or incomplete work, if any, for such Work or portion thereof, as provided in the Contract Documents. Double the amount necessary to complete the Work shall be retained by the Owner pursuant to SDCL § 5-18B-13.

## 11.8 Final Completion and Final Payment.

11.8.1 Upon receipt of written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the A/E and Owner will promptly make such inspection and, when they find the Work acceptable under the Contract Documents and the Contract fully performed, the A/E will promptly issue a final Certificate for payment stating that to the best of his observations and inspections, the Work has been completed in accordance with the terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in said final Certificate, is due and payable. The A/E's Final Certificate for Payment will constitute a further representation that the conditions precedent to the Contractor's being entitled to final payment as set forth in Sub-Article 11.8.2 have been fulfilled.

11.8.2 The final payment shall not become due until the Contractor submits to the A/E and Owner (1) an affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or his property might in any way be responsible, have been paid or otherwise satisfied, (2) consent of surety to final payment, (3) if required by the Owner, other data establishing payment or satisfaction of all such obligation, such as receipts, releases and waivers of liens arising out of the Contract, to the extent and in such form as may be designated by the Owner, (4) an Unemployment Compensation Contribution Certificate from the South Dakota Department of Labor, and (5) a full and complete release of the Owner from all liability under the Contract and otherwise, except to the extent provided in Sub-Article 11.8.4. If the Contractor fails to furnish such releases or waivers of liens as the Owner reasonably requires to determine that there are no outstanding liens, the Owner may require that Contractor, as a condition of final payment to furnish a bond satisfactory to the Owner to indemnify the Owner against any such liens. Cost of such bond shall be borne by the Contractor. If any such lien remains unsatisfied after all payments are made, the Contractor shall refund to the Owner all moneys that the latter may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

11.8.3 Owner shall make final payment of all sums due to the Contractor 30 days after the completion and acceptance of the project by the Owner and Contractor's compliance with Article 11.8.2 above. If the Owner fails to make final payment to the Contractor within the time specified herein, the Owner shall pay the Contractor interest at the rate of four percent (4%) compounded annually on the amount retained starting from the date final payment first becomes due.

11.8.4 The acceptance of final payment by the Contractor shall constitute a complete and unconditional waiver and release of any and all claims by the Contractor of whatever nature, and regardless whether they are then known or unknown, and a complete and unconditional release of the Owner and every person for whom the Owner is responsible for any and all matters related to the Contract or otherwise, except those claims which have been made in writing and identified by the Contractor as not having been settled at that time.

**Article 12**  
**PROTECTION OF PERSONS AND PROPERTY**

12.1 Safety Precautions and Programs: The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work, and for safeguarding all adjacent properties and facilities.

12.2 Safety of Persons and Property.

12.2.1 The Contractor shall take all reasonable precautions for the safety of, and shall provide all reasonable protection to prevent damage, injury or loss to:

12.2.1.1 All employees on the Work and all other persons who may be affected thereby;

12.2.1.2 All the Work and all materials and equipment to be incorporated therein, whether in storage or off the site, under the care, custody or control of the Contractor and any of his Subcontractors or Sub-subcontractors; and

12.2.1.3 Other property at the site or adjacent thereto, including but not limited to, work of the Owner or of separate contractors, trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

12.2.2 The Contractor shall give all notices and comply with all applicable laws, ordinances, rules, regulations and lawful orders of any public authority bearing on the safety of persons or property or their protection from damage, injury or loss, and shall indemnify the Owner and the A/E and save them harmless against all claims, penalties, actions and proceedings relating thereto or the Contractor's failure so to comply.

12.2.3 The Contractor shall erect and maintain, as required by existing conditions and progress of the Work, all reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent utilities.

12.2.4 When the use or storage of any hazardous materials or equipment is necessary for the execution of the Work, the Contractor shall exercise the utmost care and shall carry on such activities under the supervision of properly qualified personnel.

12.2.5 The Contractor shall promptly remedy all damage or loss to any property referred to in Sub-Articles 12.2.1.2 and 12.2.1.3 caused in whole or in part by the Contractor, any Subcontractor, any Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable and for which the Contractor is responsible under Sub-Articles 12.2.1.2 and 12.2.1.3, except damage or loss attributable to the acts or omissions of the Owner or A/E or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to his obligations under Sub-Article 6.16.

12.2.6 The Contractor shall designate a responsible member of his organization at the Site whose duty shall be the prevention of accidents. This person shall be qualified as a safety supervisor by experience, training, or education and shall have the responsibility to insure and enforce safety requirements on behalf of the Contractor and shall be designated by the Contractor in writing to the Owner and the A/E.

12.2.7 The Contractor shall issue weekly safety reports to the Owner and the A/E attesting to conditions on the Site relating to safety and to actions taken.

12.2.8 The Contractor shall not load or permit any part of the Work to be loaded so as to endanger its safety.

12.2.9 The structure of the Project is designed to support the loads of the finished building. No provision is included for stresses or loads imposed by construction operations. If the Contractor desires to place such loads in excess of the design load shown on drawings, he shall submit drawings and calculations prepared by, and bearing the seal of a professional structural engineer of the proposed method for supporting such loads for the A/E's review and approval. No loading of any kind in excess of design loads shall be placed on any part of the building structure prior to the A/E's approval of submitted drawings and calculations. The costs of the A/E's review shall be borne by the Contractor.

12.2.10 The Contractor shall prepare a written report setting forth the circumstances and details related to any accident or occurrences involving death, bodily injury, sickness, disease, personal injury, and/or loss or injury to or destruction of tangible property. Such reports shall be forwarded promptly to the insurance carriers, the A/E and the Owner.

12.3 Emergencies: In any emergency affecting the safety of persons or property, the Contractor shall act, at his discretion, to prevent threatened damage, injury or loss and shall as promptly as conditions permit notify the insurance carriers, Owner, and A/E of the nature of the emergency and circumstances related thereto. Immediately thereafter, the Contractor shall prepare a written report setting forth in detail the action taken and describing in detail all circumstance and conditions which are related to such action.

## Article 13 INSURANCE

13.1. At all times during the term of this Agreement, Contractor shall obtain and maintain in force insurance coverage of the types and with the limits as follows:

13.1.1. Commercial General Liability Insurance:

equivalent form of coverage **with a limit of not less than one million dollars (\$1,000,000) for each occurrence**. If such insurance contains a general aggregate limit it shall apply separately to this Agreement or be no less than two (2) times the occurrence limit. The insurance policy shall name the State of South Dakota, its officers and employees, as additional insureds, but liability coverage is limited to claims not barred by sovereign immunity. The State of South Dakota, its officers and employees do not hereby waive sovereign immunity for discretionary conduct as provided by law.

13.1.2. Business Automobile Liability Insurance:

Contractor shall maintain business automobile liability insurance or equivalent form **with a limit of not less than one million dollars (\$1,000,000) for each accident**. This insurance shall include coverage for owned, hired and non-owned vehicles.

13.1.3. Worker's Compensation Insurance:

Contractor shall procure and maintain workers' compensation and employers' liability insurance **as required by South Dakota or Federal law**.

13.1.4. Builder's Risk Insurance:

Contractor shall maintain builder's risk insurance **with a limit of not less than the full value of this Agreement** upon any building, structure, equipment and appliance in the process of construction or installation under state contract and upon all materials on site, until such time as the building, structure, equipment and appliances have been finally accepted by the Owner and the contract completed. This insurance shall include the interest of the Owner, Contractor, Subcontractors, and Sub-subcontractors in the Work and shall insure against loss by physical damage including, without duplication of coverage, fire, flood, extended coverage, theft, vandalism, malicious mischief, and collapse.

13.1.5. Installation Floater Insurance:

Contractor shall maintain installation floater insurance **with a limit of not less than the full value of Specialized Equipment and Material** upon specialized equipment and material not covered under the Builder's Risk Insurance in the process of construction or installation under state contract and upon all materials on site, until such time as the building, structure, equipment and appliances have been finally accepted by the Owner and the contract completed. This insurance shall include the interest of the Owner, Contractor, Subcontractors, and Sub-subcontractors in the Work and shall insure against loss by physical damage including, without duplication of coverage, fire, flood, extended coverage, theft, vandalism, malicious mischief, and collapse.

Before beginning work under this Agreement, Contractor shall submit insurance policies to the State Engineer for review and approval, and shall furnish the State with properly executed Certificates of Insurance which shall clearly evidence all insurance required in this Agreement including naming the State, its officers and employees, as additional insureds, as set forth above. In the event of a substantial change in insurance, issuance of a new policy, cancellation or nonrenewal of the policy, Contractor agrees to provide immediate notice to the State and provide a new certificate of insurance showing continuous coverage in the amounts required. Contractor shall furnish copies of any changed or new insurance policies if requested by the State.

**Article 14**  
**CHANGES IN THE WORK**

14.1 Change Orders: A Change Order is a written order to the Contractor signed by the Owner, issued after execution of the Contract, authorizing a change in the Work or an adjustment in the Contract Sum or the Contract Time. The Contract Sum and the Contract Time may be changed only by Change Order. A Change Order signed by the Contractor indicates his agreement therewith, including the adjustment in the Contract Sum or the Contract Time.

14.2 The Owner, without invalidating the Contract, may order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and the Contract Time being adjusted accordingly. All such changes in the Work shall be authorized by Change Order, and shall be performed under the applicable conditions of the Contract Documents. No later than the 5th day of each month, the A/E will process a written change order to include all outstanding RFPs.

14.3 The cost or credit to the Owner resulting from a change in the Work shall be determined in one or more of the following ways:

14.3.1 By mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation. Such lump sum proposals shall be supported by a completely detailed analysis of the proposed change subdivided into the Work of the Contractor and/or the Work of each Subcontractor and/or Sub-subcontractors involved in the proposed change, as applicable, with each such subdivision further broken down into the following elements:

14.3.1.1 Number of man-hours of labor to be performed by each trade, craft or classification of employee involved in the proposed change.

14.3.1.2 The hourly rate for each such trade, craft or classification of employee, including the appropriate wage supplement for social security, old age and unemployment contributions, and such other employee benefits as may be established by statute or by written agreement negotiated by and between organizations representing such crafts or trades and representatives of their employers.

14.3.1.3 The estimated quantity of each item or element of material and/or equipment entering into the proposed change.

14.3.1.4 The unit cost of each such item or element of material and/or equipment.

14.3.1.5 Rental of items or units of construction plant and equipment with a schedule of the period or periods of use of such item or unit in connection with the proposed change.

14.3.1.6 Rental terms and rates for each such item or unit of construction plant and equipment. Rental for equipment shall be based on the following:

14.3.1.6.1 Hourly rental rates shall be based on 80% of the applicable rates for equipment listed in the 'Green Book', latest edition, (published by the Associated Equipment Distributors, 615 West 22nd Street, Oakbrook, Illinois, 60523).

14.3.1.6.2 Hourly rental rates for equipment not listed in the 'Green Book' shall be based on 100% of the applicable rates for equipment listed in the 'Blue Book', latest edition (published by Dataquest, 1290 Ridder Park Drive, San Jose, California, 95131).

14.3.1.6.3 Hourly rental rates determined from the 'Green Book' or 'Blue Book' includes all items of cost and expense to the Contractor, including gas, oil, maintenance, repairs, insurance, and transportation to and from construction site.

14.3.1.7 Power and/or other utilities entering into the proposed change.

14.3.1.8 Rates and terms applicable to such power and/or other utilities.

14.3.1.9 Additional premiums, if applicable, for the extension of insurance and bond coverages as required herein to the proposed change.

14.3.1.10 Applicable federal, state and local taxes.

14.3.1.11 Indirect Cost and Fee computed as a percentage override applied to net cost in accordance with the provisions of this Article.

14.3.2 By unit prices stated in the Contract Documents or subsequently agreed upon;

14.3.3 By cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee;

14.3.4 By the method provided in Sub-Article 14.3.12.

14.3.5 The Contractor shall require that the itemized analysis of each portion of the proposed change to be performed by a Subcontractor and/or Sub-subcontractor be prepared by each such Subcontractor and/or Sub-subcontractor in accordance with the format established herein. Copies of all such itemized analysis shall be appended to the Contractor's itemized analysis of the proposed change in the Work.

14.3.6 For purposes of calculating Indirect Cost and Fee in relation to Change Orders, the net cost of a proposed change in the Work shall include, and unless otherwise agreed in writing prior to the performance of the proposed change, shall be limited to the fair and reasonable estimated cost of the total of all of the individual items, elements, or components involved in proposed change in the Work (including adds and deducts) as set forth in Sub-Articles 14.3.1.1 through 14.3.1.8.

14.3.7 For each portion of a proposed net additive change in the Work to be performed directly by the Contractor, the cost to Owner shall include an increment for the Indirect Cost and Fee of the Contractor associated with such portion of proposed change of 8% of the net cost of the Work.

14.3.8 For each portion of a proposed net additive change in the Work to be performed directly by a Subcontractor, in addition to an increment or increments for Subcontractor's Indirect Cost and profit associated therewith of 8%, the cost to the Owner shall include a supplementary increment or increments for Contractor's Indirect Cost and Fee associated therewith of 6% of the net cost of the Work.

14.3.9 In computing Indirect Cost and Fee, the percentage for Indirect Cost and Fee shall be taken on basic wage only. No percentage override shall be taken on Social Security, Old Age and Unemployment contributions, contributions to Industry funds, education, and Training Funds and/or similar wage supplements, contributions or benefits.

14.3.10 Items, elements or components of changes in the Work or proposed changes which shall be classified as Indirect Cost and excluded from net cost shall include, but shall not necessarily be limited to:



14.3.10.1 All classifications of administrative, supervisory, and clerical personnel not engaged manually in the performance of the Work, including timekeepers, clerks, watchmen, and security personnel.

14.3.10.2 Miscellaneous expense, job burden, and/or other generalized categories of cost or expense.

14.3.10.3 Use of small tools and miscellaneous materials.

14.3.10.4 Insurance other than insurance coverage required herein.

14.3.11 In changes in the Work involving both additions to and deductions in the Work, or any portion or element thereof, or the relocation or rearrangement of items, portions or elements thereof, or the substitution of any items, portions or elements thereof, such additions and deductions shall be balanced, and the Contractor's Fee computed on the same basis for deductions as well as additions. If at the request of the A/E and/or the Owner a number of unrelated changes in the Work are set forth individually, summarized and totaled in a single Change Order for reasons of administrative convenience, the amount or amounts of individual deductive changes in the Work set forth therein shall, in any event, be balanced against the amount or amounts of individual additive changes in computing the Contractor's Fee for the purpose of adding and deducting.

14.3.12 If none of the methods set forth in Sub-Articles 14.3.1, .3.2 or .3.3 is agreed upon, the Contractor, provided he receives a written order signed by the Owner, shall promptly proceed with the Work involved. The cost of such Work shall then be determined by the Owner on the basis of the reasonable expenditures and savings of those performing the Work attributable to the change, including, in the case of an increase in the Contract Sum, a reasonable allowance for the Contractor's Fee. In such case, and also under Sub-Articles 14.3.3 and .3.4 above, the Contractor shall keep and present, in such form as the Owner may prescribe, an itemized accounting together with appropriate supporting data for inclusion in a Change Order, at the end of each day, and will submit to the Owner or his designated representative: (a) daily time slips showing the name of each workman employed on such work, the number of hours which he is employed thereon, the character of his duties, and the wages and benefits to be paid to him and on his behalf, and (b) a memorandum of the equipment used in the performance of such Work, together with the rental claimed therefor. Unless otherwise provided in the Contract Documents, cost shall be limited to the following: cost of materials, including sales tax and cost of delivery; cost of labor, including social security, old age and unemployment insurance, and fringe benefits required by agreement or custom; worker's or workmen's compensation insurance; bond premiums; rental value of equipment and machinery; and the additional costs of supervision and field office personnel directly attributable to the change. Pending final determination of cost to the Owner, payments on account shall be made on the basis of amounts reasonably estimated by the Owner. The amount of credit to be allowed by the Contractor to the Owner for any deletion or change which results in a net decrease in the Contract sum will be the amount of the actual net cost as confirmed by the A/E and agreed to by the Owner. When both additions and credits covering related Work or substitutions are involved in any one change, the allowance or credit for the Contractor's Fee shall be figured on the basis of the net increase, or decrease, if any, with respect to that change.

#### 14.4 Differing Site Conditions

14.4.1 The Contractor shall promptly, and before the conditions are disturbed, give a written notice to the A/E of (1) subsurface or latent physical conditions at the site which differ materially from those indicated in this contract, or (2) unknown physical conditions at the site, of an unusual nature, which differ materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in the contract.

14.4.2 The A/E shall investigate the site conditions promptly after receiving the notice. If the conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performing any part of the work under this contract, whether or not changed as a result of the conditions, the Contract Sum shall be adjusted as provided in this Article, provided that the work has been ordered in writing by Owner and A/E as provided in Sub-Article 14.1 above. There shall be included in the adjustment to the Contract Sum under the preceding sentence a reasonable allowance for any extraordinary increase in Indirect Cost borne by the Contractor because of such additional work.

#### 14.5 Claims for Additional Cost.

14.5.1 If the Contractor wishes to make a claim for an increase in the Contract Sum, he shall give the A/E and Owner a written notice thereof within 10 days after the occurrence of the event giving rise to such claim except where claim is made in connection with deviations in Shop Drawing or Sample submittals, in which case claim shall be made in writing to the A/E concurrently with such submittals. This notice shall be given by the Contractor before proceeding to execute the work, except in an emergency endangering life or property in which case the Contractor shall proceed in accordance with Sub-Article 12.3. No such claim shall be valid unless so made. Any change in the Contract Sum resulting from such claim shall be authorized by Change Order.

14.5.2 If the Contractor claims that additional cost is involved because of, but not limited to, (1) any written interpretation pursuant to Sub-Article 4.13, (2) any order by the Owner to stop the Work pursuant to Sub-Article 5.2 where the Contractor was not at fault, (3) any written order for a minor change in the Work issued pursuant to Sub-Article 14.6, or (4) any deviation in Shop Drawing or Sample submittals from the requirements of the Contract Documents, the Contractor shall make such claim as provided in Sub-Article 14.5.1.

14.6 Minor Changes in the Work: The A/E will have authority to order minor changes in the Work not involving an adjustment in the Contact Sum or an extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes shall be effected by written order, and shall be binding on the Owner and the Contractor. The Contractor shall carry out such written orders promptly.

**Article 15**  
**UNCOVERING AND CORRECTION OF WORK**

15.1 Uncovering of Work.

15.1.1 If any portion of the Work should be covered contrary to the request of the A/E or the Owner, or the requirements specifically expressed in the Contract Documents, it must, if required in writing by the A/E or the Owner, be uncovered for his observation and shall be replaced at the Contractor's expense.

15.1.2 If any other portion of the Work has been covered which the A/E or the Owner has not specifically required to observe prior to being covered, the A/E or the Owner may request to see such Work and it shall be uncovered by the Contractor. If such work be found in accordance with the Construction Documents, the cost of uncovering and replacement shall, by appropriate Change Order, be charged to the Owner. If such work be found not in accordance with the Construction Documents, the Contractor shall pay such costs unless it be found that this condition was caused by the Owner or a separate contractor as provided in Article 8, in which event the Owner shall be responsible for the payment of such costs.

15.2 Correction of Work.

15.2.1 The Contractor shall promptly correct all Work rejected by the A/E as defective or as failing to conform to the Construction Documents whether observed before or after Substantial Completion and whether or not fabricated, installed or completed. The Contractor shall bear all costs of correcting such rejected Work, including compensation for the A/E's additional services and the Office of the State Engineer fees made necessary thereby.

15.2.2 If, at any time after the Owner's acceptance of the fully completed Project any of the Work is found not to have been provided in conformance with the Construction Documents, or, if within one year after such acceptance any of the Work is otherwise found to be faulty or defective, the Contractor shall correct it promptly after receipt of a written notice from the Owner to do so. The Contractor shall also repair or replace any part of the Work which is damaged by the defective condition or the remedial Work. This obligation shall survive termination of the Contract, subject to the terms of any applicable statute of limitations. The Owner shall give such notice promptly after discovery of the condition.

15.2.3 The Contractor shall remove from the Site all portions of the Work which are defective or non-conforming and which have not been corrected under Sub-Articles 6.4.1, 15.2.1 and 15.2.2, unless removal is waived by the Owner.

15.2.4 If the Contractor fails to correct defective or non-conforming Work as provided in Sub-Articles 6.4.1, 15.2.1 and 15.2.2, the Owner may correct it in accordance with Sub-Article 5.3.

15.2.5 If the Contractor does not proceed with the correction of such defective or non-conforming Work within a reasonable time fixed by written notice from the A/E, the Owner may remove it and may store the materials or equipment at the expense of the Contractor. If the Contractor does not pay the cost of such removal and storage within 10 days thereafter, the Owner may upon 10 additional days written notice sell such Work at auction or a private sale and shall account for the net proceeds thereof, after deducting all the costs that should have been borne by the Contractor, including compensation for the A/E's additional services made necessary thereby. If such proceeds of sale do not cover all costs which the Contractor should have borne, the difference shall be charged to the Contractor and an appropriate Change Order shall be issued. If the payments then or thereafter due to the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the Owner upon demand.

15.2.6 The Contractor shall bear the cost of making good all work of the Owner or separate contractors destroyed or damaged by such correction removal.

15.2.7 Nothing contained in this Article shall be construed to establish a period of limitation with respect to any other obligation which the Contractor might have under the Contract Documents, including Sub-Article 6.4 hereof. The establishment of any time period prescribed by the terms of any warranty required by the Contract Documents relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which his obligation to comply with the Contract Documents may be sought to be enforced, nor the time within which proceedings may be commenced to establish the Contractor liability with respect to his obligations other than specifically to correct the Work.

15.3 Acceptance of Defective or Non-Conforming Work: If the Owner prefers to accept defective or non-conforming Work, he may do so instead of requiring its removal and correction, in which case a Change Order will be issued to reflect a reduction in the Contract Sum where appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

**Article 16**  
**TERMINATION OF THE CONTRACT**

16.1 Termination by the Contractor: If the Work is stopped for a period of 90 days under an order of any court or any public authority having jurisdiction, or as a result of an act of government, such as a declaration of a national emergency making materials unavailable, through no act or fault of the Contractor or Subcontractor or their agents or employees or any other persons performing any of the Work under a contract with the Contractor, then the Contractor may, upon 7 additional days written notice to the Owner and the A/E, terminate the Contract and recover from the Owner payment for all Work executed to the termination date, together with reasonable demobilization costs. The Contractor shall have no other right to terminate the Contract for any reason.

16.2 Termination by the Owner.

16.2.1 If the Contractor is in default under the Contract Documents, the Owner may, without prejudice to any other right or remedy and upon written notice to the Contractor, terminate the contract.

Prior to termination of the Contract, the Owner shall give the Contractor and his surety 10 calendar days written notice, during which the Contractor and/or his surety may rectify the cause of the termination. If rectified to the satisfaction of the Owner within said 10 days, the Owner may rescind its notice of termination. If not rectified, the termination for cause shall become effective at the end of the 10 day notice period. In the alternative, the Owner may postpone the effective date of the termination notice, at its sole discretion, if it should receive reassurances from the Contractor and its surety that the causes of termination will be remedied in a time and manner which the Owner finds acceptable. If at any time more than 10 days after the notice of termination, the Owner determines that the Contractor or its surety has not or is not likely to rectify the causes of termination in an acceptable manner or within the time allowed, then the Owner may immediately terminate the Contract for cause by giving written notice to the Contractor and its surety. In no event shall termination for cause terminate the obligations of the Contractor's surety on its payment and performance bonds.

Notice of termination, whether initial or given after a period of postponement, may be served upon the Contractor and the surety by mail or any other means at their last known places of business in South Dakota or elsewhere, by delivery to any officer or management/supervisory employee of either wherever they may be found, or, if no such officer, employee or place of business is known or can be found by reasonable inquiry within 3 days, by posting the notice at the job site. Failure to accept or pick up registered or certified mail addressed to the last known address shall be deemed to be delivery.

Upon termination of the Contract, the Owner shall take possession of the premises and of all materials, tools, appliances, equipment, and other facilities on the Project, wherever stored, and may finish the Work by whatever method he may deem expedient. The Contractor shall assign Subcontracts to the Owner or to a designated substitute contractor promptly upon request. In such case the Contractor shall not be entitled to receive any further payment until the Work is finished and the Owner has determined its damages owing to the Contractor's default.

16.2.2 If the costs of finishing the Work, including compensation for the A/E's and Office of the State Engineer's additional services made necessary by the Contractor's default, and all other damages suffered by the Owner on account of the Contractor's default, exceed the unpaid balance of the Contract Sum, the Contractor shall pay the difference to the Owner, and this obligation for payment shall survive the termination of the Contract. If the costs of finishing the Work are less than the unpaid portion of the contract Sum, the Owner shall pay the unpaid balance of any amount properly owing to the Contractor for all Work executed to the date of termination, less actual damages. The Owner will not be obligated to pay any further amount on account of Direct Cost, Indirect Cost or Fee.

16.2.3 If it should be judicially determined that the Owner improperly terminated this Contract for cause, then the termination shall be deemed to be a termination for the convenience of the Owner.

### 16.3 Termination for Convenience.

16.3.1 The Owner may terminate this Contract at any time without cause, in whole or in part, upon giving the Contractor notice of such termination. Upon such termination, the Contractor shall immediately cease Work and remove from the project site all of its labor forces and such of its materials as Owner elects not to purchase or to assume in the manner hereinafter provided. Upon such termination, the Contractor shall take such steps as Owner may require to assign to the Owner the Contractor's interest in all Subcontracts and purchase orders designated by Owner. After all such steps have been taken to Owner's satisfaction, the Contractor shall receive as full compensation for termination and assignment the following:

- (1) All amounts then otherwise due under the terms of this Contract,
- (2) Amounts due for work performed subsequent to the latest Request for Payment through the date of termination,
- (3) Reasonable compensation for the actual cost of demobilization incurred by the Contractor as a direct result of such termination. The Contractor shall not be entitled to any compensation for lost profits or for any other type of contractual compensation or damage other than those provided by the preceding sentence. Upon payment of the foregoing, Owner shall have no further obligations to Contractor of any nature.

16.3.2 In no event shall termination for the convenience of the Owner terminate the obligations of the Contractor's surety on its payment and performance bonds.

**BARNETT CENTER LOCKER ROOM REMODEL  
NORTHERN STATE UNIVERSITY  
ABERDEEN, SD**

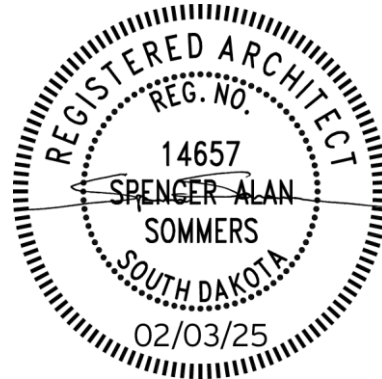
OSE #R0124--16X

CO-OP #2437

February 3, 2025

Project Contacts:

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## **TECHNICAL SPECIFICATIONS TABLE OF CONTENTS**

### **DIVISION 01 - GENERAL REQUIREMENTS**

011000	SUMMARY
012000	PRICE AND PAYMENT PROCEDURES
012300	ALTERNATES
012500	SUBSTITUTION PROCEDURES
012510	SUBSTITUTION REQUEST FORM
013000	ADMINISTRATIVE REQUIREMENTS
013216	CONSTRUCTION PROGRESS SCHEDULE
014000	QUALITY REQUIREMENTS
016000	PRODUCT REQUIREMENTS
017000	EXECUTION AND CLOSEOUT REQUIREMENTS
017800	CLOSEOUT SUBMITTALS
017900	DEMONSTRATION AND TRAINING

### **DIVISION 02 – EXISTING CONDITIONS**

024100	DEMOLITION
--------	------------

### **DIVISION 03 – CONCRETE**

030516	UNDERSLAB VAPOR BARRIER
033000	CAST-IN-PLACE CONCRETE

### **DIVISION 04 - MASONRY**

042000	UNIT MASONRY
--------	--------------

### **DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES**

061000	ROUGH CARPENTRY
064100	ARCHITECTURAL WOOD CASEWORK

### **DIVISION 07 - THERMAL AND MOISTURE PROTECTION**

079000	JOINT SEALANTS
--------	----------------

### **DIVISION 08 – OPENINGS**

081113	HOLLOW METAL DOORS AND FRAMES
081416	FLUSH WOOD DOORS
087100	DOOR HARDWARE

### **DIVISION 09 - FINISHES**

090561	COMMON WORK RESULTS FOR FLOORING PREPARATION
092116	GYPSUM BOARD ASSEMBLIES
093000	TILING
096813	TILE CARPETING
099000	PAINTING AND COATING



## **DIVISION 10 – SPECIALTIES**

102113.19	PLASTIC TOILET COMPARTMENTS
102800	TOILET, BATH, AND LAUNDRY ACCESSORIES
105116	WOOD LOCKERS

## **DIVISION 12 - FURNISHINGS**

123600	COUNTERTOPS
--------	-------------

## **DIVISION 21 – FIRE PROTECTION**

21 0500	GENERAL FIRE PROTECTION REQUIREMENTS
21 0510	BASIC FIRE PROTECTION MATERIALS AND METHODS
21 1313	FIRE SUPPRESSION

## **DIVISION 22 – PLUMBING**

22 0500	GENERAL PLUMBING REQUIREMENTS
22 0510	BASIC PLUMBING MATERIALS AND METHODS
22 0700	PLUMBING SYSTEMS INSULATION
22 4000	PLUMBING

## **DIVISION 23 – HEATING, VENTILATION AND AIR CONDITIONING**

23 0500	GENERAL HVAC REQUIREMENTS
23 0510	BASIC HVAC MATERIALS AND METHODS
23 0700	HVAC SYSTEMS INSULATION
23 0900	CONTROLS & CONTROL SEQUENCES
23 7000	VENTILATION AND AIR CONDITIONING

## **DIVISION 26 - ELECTRICAL**

260500	COMMON WORK RESULTS FOR ELECTRICAL
260519	LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
260526	GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
260529	HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
260533	RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS
260543	UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS
260553	IDENTIFICATION FOR ELECTRICAL SYSTEMS
260923	LIGHTING CONTROL DEVICES
262726	WIRING DEVICES
262813	FUSES
262816	ENCLOSED SWITCHES AND CIRCUIT BREAKERS
265119	LED INTERIOR LIGHTING

## **DIVISION 27 - COMMUNICATIONS**

270500	COMMON WORK RESULTS FOR COMMUNICATIONS
271100	COMMUNICATIONS EQUIPMENT ROOM FITTINGS
271500	COMMUNICATIONS HORIZONTAL CABLING

**DIVISION 28 – ELECTRONIC SAFETY AND SECURITY**

280500	COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY
280513	CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY
283111	DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

**INDEX OF DRAWINGS**

**COVER**

**CODE**

G000 CODE STANDARDS  
G001 BUILDING SYSTEMS INFORMATION

**ARCHITECTURAL**

D-101 TRACK & FIELD DEMOLITION PLAN  
D-102 WRESTLING & BASEBALL DEMOLITION PLAN  
A-101 TRACK & FIELD FLOOR PLAN  
A-102 WRESTLING & BASEBALL FLOOR PLAN  
A-103 TRACK & FIELD REFLECTED CEILING PLAN  
A-104 WRESTLING & BASEBALL REFLECTED CEILING PLAN  
A-105 WRESTLING & BASEBALL FLOOR FINISH PLAN  
A-106 TRACK & FIELD FLOOR FINISH PLAN  
A-601 FINISH SCHEDULE & ROOM SCHEDULE  
A-602 WOMEN'S TRACK & FIELD LOCKER ROOM INTERIOR ELEVATIONS  
A-603 MEN'S TRACK & FIELD LOCKER ROOM INTERIOR ELEVATIONS  
A-604 WRESTLING & BASEBALL LOCKER ROOM INTERIOR ELEVATIONS  
A-605 WRESTLING LOCKER ROOM INTERIOR ELEVATIONS  
A-606 DOOR SCHEDULE, DETAILS, SECTIONS

**MECHANICAL**

EM100 LEGENDS & SHEET INDEX  
M200 PLUMBING & HYDRONICS DEMOLITION PLAN  
M300 FIRE SPRINKLER & HVAC DEMOLITION PLAN  
M400 PLUMBING & HYDRONICS PLAN  
M500 FIRE PROTECTION PLAN

**ELECTRICAL**

E200 ELECTRICAL DEMOLITION PLAN  
E300 POWER & DATA PLAN  
E400 LIGHTING & SPECIAL SYSTEMS PLAN

**SECTION 011000  
SUMMARY**

**PART 1 GENERAL**

**1.01 PROJECT**

- A. Project Name: NSU Barnett Center Locker Room Remodel.
- B. Owner's Name: Northern State University.
- C. Architect's Name: CO-OP Architecture.
- D. The Project consists of the renovation of locker rooms in the NSU Barnett Center to include demolition, new finishes, lockers, plumbing, mechanical, and electrical.

**1.02 DESCRIPTION OF ALTERATIONS WORK**

- A. Scope of alterations work is indicated on drawings.
- B. Plumbing: Alter existing system and add new construction, keeping existing in operation.
- C. HVAC: Alter existing system and add new construction, keeping existing in operation.
- D. Electrical Power and Lighting: Alter existing system and add new construction, keeping existing in operation.
- E. Fire Suppression Sprinklers: Alter existing system and add new construction, keeping existing in operation.
- F. Fire Alarm: Alter existing and add new construction.
- G. Security System: Alter existing system and add new construction, keeping existing in operation.

**1.03 OWNER OCCUPANCY**

- A. Owner intends to continue to occupy adjacent portions of the existing building during the entire construction period.
- B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

**1.04 CONTRACTOR USE OF SITE**

- A. Construction Operations: Limited to areas noted on Drawings.
  - 1. Locate and conduct construction activities in ways that will limit disturbance to site.
- B. Provide access to and from site as required by law and by Owner:
  - 1. Do not obstruct roadways, sidewalks, or other public ways without permit.
- C. Utility Outages and Shutdown:
  - 1. Prevent accidental disruption of utility services to other facilities.

**END OF SECTION**

**SECTION 012000  
PRICE AND PAYMENT PROCEDURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Procedures for preparation and submittal of applications for progress payments.

**1.02 SCHEDULE OF VALUES**

- A. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect for approval.
- B. Forms filled out by hand will not be accepted.
- C. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.

**1.03 APPLICATIONS FOR PROGRESS PAYMENTS**

- A. Payment Period: Submit at intervals stipulated in the Agreement.
- B. Forms filled out by hand will not be accepted.
- C. For each item, provide a column for listing each of the following:
  - 1. Item Number.
  - 2. Description of work.
  - 3. Scheduled Values.
  - 4. Previous Applications.
  - 5. Work in Place and Stored Materials under this Application.
  - 6. Authorized Change Orders.
  - 7. Total Completed and Stored to Date of Application.
  - 8. Percentage of Completion.
  - 9. Balance to Finish.
  - 10. Retainage.
- D. Execute certification by signature of authorized officer.
- E. Submit three copies of each Application for Payment.

**1.04 MODIFICATION PROCEDURES**

- A. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Architect will issue instructions directly to Contractor.
- B. For other required changes, Architect will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
  - 1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
  - 2. Promptly execute the change.
- C. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 7 days.
- D. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
- E. Substantiation of Costs: Provide full information required for evaluation.
  - 1. On request, provide the following data:
    - a. Quantities of products, labor, and equipment.
    - b. Taxes, insurance, and bonds.
    - c. Overhead and profit.

- d. Justification for any change in Contract Time.
- e. Credit for deletions from Contract, similarly documented.
- F. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

**1.05 APPLICATION FOR FINAL PAYMENT**

- A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- B. Application for Final Payment will not be considered until the following have been accomplished:
  - 1. All closeout procedures specified in Section 017000.

**END OF SECTION**

**SECTION 012300  
ALTERNATES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Description of Alternates.

**1.02 ACCEPTANCE OF ALTERNATES**

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Contractor Agreement.
- B. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

**1.03 SCHEDULE OF ALTERNATES**

- A. Alternate No. 1 - Needlepoint Bi-Polar Ionization Systems – Add Alternate :
  - 1. As shown and indicated on the contract drawings, provide & install needlepoint bi-polar ionization systems in ductwork to serve the wrestling areas in the remodel, and the existing wrestling room. See contract drawings for details.
- B. Alternate No. 2 - Air & Surface Disinfection System – Add Alternate :
  - 1. As shown and indicated on the contract drawings, provide & install air and surface disinfection systems in ductwork and in spaces to serve the wrestling areas in the remodel, and the existing wrestling room. See contract drawings for details.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

**SECTION 012500  
SUBSTITUTION PROCEDURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Procedural requirements for proposed substitutions.

**1.02 RELATED REQUIREMENTS**

- A. Instructions to Bidders.
- B. Section 012200 - Unit Prices, for additional unit price requirements.
- C. Section 016000 - Product Requirements: Fundamental product requirements, product options, delivery, storage, and handling.

**1.03 DEFINITIONS**

- A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 GENERAL REQUIREMENTS**

- A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
  - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
  - 2. Agrees to provide the same warranty for the substitution as for the specified product.
  - 3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
  - 4. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
  - 5. Waives claims for additional costs or time extension that may subsequently become apparent.
- B. A Substitution Request for specified installer constitutes a representation that the submitter:
  - 1. Has acted in good faith to obtain services of specified installer, but was unable to come to commercial, or other terms.
- C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
- D. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
  - 1. No specific form is required. Contractor's Substitution Request documentation must include the following:
    - a. Project Information:
      - 1) Official project name and number, and any additional required identifiers established in Contract Documents.
    - b. Substitution Request Information:
      - 1) Discrete and consecutive Substitution Request number, and descriptive subject/title.
      - 2) Indication of whether the substitution is for cause or convenience.
      - 3) Issue date.
      - 4) Reference to particular Contract Document(s) specification section number, title, and article/paragraph(s).
      - 5) Description of Substitution.
      - 6) Differences between proposed substitution and specified item.



- 7) Description of how proposed substitution affects other parts of work.
- c. Attached Comparative Data: Provide point-by-point, side-by-side comparison addressing essential attributes specified, as appropriate and relevant for the item:
  - 1) Physical characteristics.
  - 2) In-service performance.
  - 3) Expected durability.
  - 4) Visual effect.
  - 5) Warranties.
  - 6) Other salient features and requirements.
  - 7) Include, as appropriate or requested, the following types of documentation:
    - (a) Product Data:
    - (b) Certificates, test, reports or similar qualification data.
    - (c) Drawings, when required to show impact on adjacent construction elements.
- d. Impact of Substitution:
  - 1) Savings to Owner for accepting substitution.
  - 2) Change to Contract Time due to accepting substitution.
- E. Limit each request to a single proposed substitution item.
  - 1. Submit an electronic document, combining the request form with supporting data into single document.

### **3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT**

- A. Submittal Time Restrictions:
  - 1. Instructions to Bidders specifies time restrictions and the documents required for submitting substitution requests during the bidding period.

### **3.03 RESOLUTION**

- A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.
- B. Substitution requests that are approved will be documented in the project addenda.

**END OF SECTION**

**PRIOR APPROVAL / SUBSTITUTION  
REQUEST FORM**

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

Company Submitting Request: \_\_\_\_\_  
(Name and Address)

---

Contact Name: \_\_\_\_\_ Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

E-Mail: \_\_\_\_\_

PROJECT NAME: \_\_\_\_\_

SPECIFIED ITEM: \_\_\_\_\_  
(Section) (Page) (Description)

The undersigned requests consideration of the following product substitution:

PROPOSED SUBSTITUTION: \_\_\_\_\_  
Provide Product Name / Model /Manufacturer

1. Attached data includes: \_\_\_\_\_ Product Description \_\_\_\_\_ Performance and Test Data  
\_\_\_\_\_ Drawings \_\_\_\_\_ Specifications \_\_\_\_\_  
Photographs

2. \_\_\_\_\_ Yes / No changes will be required to the Contract Documents for the proper installation of proposed product substitution. If yes, then attach data that includes description of changes.

**The undersigned states that the following paragraphs, unless modified by attachments, are correct:**

1. The proposed substitution does not affect dimensions shown on the drawings.
2. No changes to the building design, engineering design, or detailing are required by the proposed substitution.
3. The proposed substitution will have no adverse effect on other trades, the construction schedule, or **specified warranty requirements.**
4. No maintenance is required by the proposed substitution other than that required for originally specified product.
5. Other Information

**The undersigned further states that they have read the corresponding specification section in the project manual and confirms that the function, appearance and quality of the proposed substitution are equivalent or superior to the originally specified product.**\_initial.

Signature: \_\_\_\_\_ Printed Name: \_\_\_\_\_

Fax Number: \_\_\_\_\_

---

**For Architect's Use:**

\_\_\_\_ Accepted \_\_\_\_\_ Accepted As Noted \_\_\_\_\_ Incomplete Information

\_\_\_\_ Not Accepted  
This

\_\_\_\_ Received Too Late

\_\_\_\_ No Substitutions Accepted For  
Product

Reviewed By / Date: \_\_\_\_\_

Processed by Addendum No. \_\_\_\_\_

Comments: \_\_\_\_\_

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**SECTION 013000  
ADMINISTRATIVE REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Electronic document submittal service.
- B. Preconstruction meeting.
- C. Progress meetings.
- D. Submittals for review, information, and project closeout.
- E. Number of copies of submittals.
- F. Submittal procedures.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE**

- A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF) format and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.
  - 1. Besides submittals for review, information, and closeout, this procedure applies to requests for information (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
  - 2. It is Contractor's responsibility to submit documents in PDF format.
  - 3. Users of the service need an email address, Internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, [www.adobe.com](http://www.adobe.com), or Bluebeam PDF Revu, [www.bluebeam.com](http://www.bluebeam.com)), unless such software capability is provided by the service provider.
  - 4. Paper document transmittals will not be reviewed; emailed PDF documents will not be reviewed.
- B. Submittal Service: The selected service is:
  - 1. Submittal Exchange (tel: 1-800-714-0024): [www.submittalexchange.com/#sle](http://www.submittalexchange.com/#sle).

**3.02 PRECONSTRUCTION MEETING**

- A. Architect will schedule a meeting after Notice of Award.
- B. Attendance Required:
  - 1. Owner.
  - 2. Architect.
  - 3. Contractor.
- C. Agenda:
  - 1. Execution of Owner-Contractor Agreement.
  - 2. Submission of executed bonds and insurance certificates.
  - 3. Distribution of Contract Documents.
  - 4. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.
  - 5. Designation of personnel representing the parties to Contract and .
  - 6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
  - 7. Scheduling.
- D. Record minutes and distribute copies within two days after meeting to participants, with two

copies to Architect, Owner, participants, and those affected by decisions made.

### **3.03 PROGRESS MEETINGS**

- A. Attendance Required:
  - 1. Contractor.
  - 2. Owner.
  - 3. Architect.
  - 4. Contractor's Superintendent.
  - 5. Major Subcontractors.
- B. Agenda:
  - 1. Review minutes of previous meetings.
  - 2. Review of Work progress.
  - 3. Field observations, problems, and decisions.
  - 4. Identification of problems that impede, or will impede, planned progress.
  - 5. Review of submittals schedule and status of submittals.
  - 6. Maintenance of progress schedule.
  - 7. Corrective measures to regain projected schedules.
  - 8. Planned progress during succeeding work period.
  - 9. Maintenance of quality and work standards.
  - 10. Effect of proposed changes on progress schedule and coordination.
  - 11. Other business relating to Work.
- C. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

### **3.04 CONSTRUCTION PROGRESS SCHEDULE - SEE SECTION 013216**

- A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.

### **3.05 SUBMITTALS FOR REVIEW**

- A. Submit to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
- B. Samples will be reviewed only for aesthetic, color, or finish selection.
- C. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 017800 - Closeout Submittals.
- D. Submit for Architect's knowledge as contract administrator or for Owner. No action will be taken.
- E. When the following are specified in individual sections, submit them at project closeout:

### **3.06 NUMBER OF COPIES OF SUBMITTALS**

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

### **3.07 SUBMITTAL PROCEDURES**

- A. Shop Drawing Procedures:
  - 1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related Work.
  - 2. Generic, non-project specific information submitted as shop drawings do not meet the requirements for shop drawings.
- B. Transmit each submittal with a copy of approved submittal form.
- C. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.
- D. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number,

and specification section number, as appropriate on each copy.

- E. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.
- F. Schedule submittals to expedite the Project, and coordinate submission of related items.
- G. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
- H. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.
- I. Provide space for Contractor and Architect review stamps.
- J. When revised for resubmission, identify all changes made since previous submission.
- K. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
- L. Submittals not requested will not be recognized or processed.

**END OF SECTION**

**SECTION 013216  
CONSTRUCTION PROGRESS SCHEDULE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Preliminary schedule.
- B. Construction progress schedule, bar chart type.

**1.02 SUBMITTALS**

- A. Within 10 days after date of Agreement, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Within 10 days after joint review, submit complete schedule.
- D. Submit updated schedule with each Application for Payment.

**1.03 SCHEDULE FORMAT**

- A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 PRELIMINARY SCHEDULE**

- A. Prepare preliminary schedule in the form of a horizontal bar chart.

**3.02 CONTENT**

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
- B. Identify each item by specification section number.
- C. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.
- D. Provide separate schedule of submittal dates for shop drawings, product data, and samples, owner-furnished products, and dates reviewed submittals will be required from Architect. Indicate decision dates for selection of finishes.
- E. Indicate delivery dates for owner-furnished products.
- F. Provide legend for symbols and abbreviations used.

**3.03 BAR CHARTS**

- A. Include a separate bar for each major portion of Work or operation.
- B. Identify the first work day of each week.

**3.04 REVIEW AND EVALUATION OF SCHEDULE**

- A. Participate in joint review and evaluation of schedule with Architect at each submittal.
- B. Evaluate project status to determine work behind schedule and work ahead of schedule.
- C. After review, revise as necessary as result of review, and resubmit within 10 days.

**3.05 UPDATING SCHEDULE**

- A. Maintain schedules to record actual start and finish dates of completed activities.
- B. Indicate progress of each activity to date of revision, with projected completion date of each activity.
- C. Annotate diagrams to graphically depict current status of Work.
- D. Identify activities modified since previous submittal, major changes in Work, and other

identifiable changes.

- E. Indicate changes required to maintain Date of Substantial Completion.
- F. Submit reports required to support recommended changes.

**3.06 DISTRIBUTION OF SCHEDULE**

- A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Architect, Owner, and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

**END OF SECTION**



**SECTION 014000  
QUALITY REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Control of installation.
- B. Testing and inspection agencies and services.
- C. Control of installation.
- D. Mock-ups.
- E. Defect Assessment.

**1.02 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor.
  - 1. Include:
    - a. Date issued.
    - b. Project title and number.
    - c. Name of inspector.
    - d. Date and time of sampling or inspection.
    - e. Identification of product and specifications section.
    - f. Location in the Project.
    - g. Type of test/inspection.
    - h. Date of test/inspection.
    - i. Results of test/inspection.
    - j. Conformance with Contract Documents.
    - k. When requested by Architect, provide interpretation of results.

**1.03 TESTING AND INSPECTION AGENCIES AND SERVICES**

- A. Owner will employ and pay for services of an independent testing agency to perform other specified testing.
- B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

**PART 3 EXECUTION**

**2.01 CONTROL OF INSTALLATION**

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have Work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

## **2.02 TESTING AND INSPECTION**

- A. Testing Agency Duties:
  - 1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
  - 2. Perform specified sampling and testing of products in accordance with specified standards.
  - 3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
  - 4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of Work or products.
  - 5. Perform additional tests and inspections required by Architect.
  - 6. Submit reports of all tests/inspections specified.
- B. Limits on Testing/Inspection Agency Authority:
  - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
  - 2. Agency may not approve or accept any portion of the Work.
  - 3. Agency may not assume any duties of Contractor.
  - 4. Agency has no authority to stop the Work.
- C. Contractor Responsibilities:
  - 1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
  - 2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
  - 3. Provide incidental labor and facilities:
    - a. To provide access to Work to be tested/inspected.
    - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
    - c. To facilitate tests/inspections.
    - d. To provide storage and curing of test samples.
  - 4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
  - 5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
  - 6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- D. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.
- E. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

## **2.03 DEFECT ASSESSMENT**

- A. Replace Work or portions of the Work not conforming to specified requirements.

**END OF SECTION**

**SECTION 016000  
PRODUCT REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Transportation, handling, storage and protection.
- B. Product option requirements.
- C. Substitution limitations and procedures.
- D. Maintenance materials, including extra materials, spare parts, tools, and software.

**1.02 SUBMITTALS**

- A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
  - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

**PART 2 PRODUCTS**

**2.01 PRODUCT OPTIONS**

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

**2.02 MAINTENANCE MATERIALS**

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

**PART 3 EXECUTION**

**3.01 SUBSTITUTION PROCEDURES**

- A. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- B. A request for substitution constitutes a representation that the submitter:
  - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
  - 2. Agrees to provide the same warranty for the substitution as for the specified product.
  - 3. Agrees to coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
  - 4. Waives claims for additional costs or time extension that may subsequently become apparent.

**3.02 TRANSPORTATION AND HANDLING**

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

### **3.03 STORAGE AND PROTECTION**

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- G. Comply with manufacturer's warranty conditions, if any.
- H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- I. Prevent contact with material that may cause corrosion, discoloration, or staining.
- J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

**END OF SECTION**

**SECTION 017000  
EXECUTION AND CLOSEOUT REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.
- C. Pre-installation meetings.
- D. Cutting and patching.
- E. Cleaning and protection.
- F. Starting of systems and equipment.
- G. Demonstration and instruction of Owner personnel.
- H. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

**1.02 RELATED REQUIREMENTS**

- A. Section 017900 - Demonstration and Training: Demonstration of products and systems to be commissioned and where indicated in specific specification sections

**1.03 PROJECT CONDITIONS**

- A. Use of explosives is not permitted.
- B. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

**1.04 COORDINATION**

- A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Notify affected utility companies and comply with their requirements.
- C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- F. Coordinate completion and clean-up of work of separate sections.
- G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

**PART 2 PRODUCTS**

**2.01 PATCHING MATERIALS**

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 016000 - Product Requirements.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

#### **3.02 PREPARATION**

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

#### **3.03 PREINSTALLATION MEETINGS**

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Architect four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
  - 1. Review conditions of examination, preparation and installation procedures.
  - 2. Review coordination with related work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

#### **3.04 GENERAL INSTALLATION REQUIREMENTS**

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

#### **3.05 ALTERATIONS**

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
  - 1. Verify that construction and utility arrangements are as shown.
  - 2. Report discrepancies to Architect before disturbing existing installation.

3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
  1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
  2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.
- C. Remove existing work as indicated and as required to accomplish new work.
  1. Remove items indicated on drawings.
  2. Relocate items indicated on drawings.
  3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
  4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- D. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
  1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
  2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
  3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
    - a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
    - b. Provide temporary connections as required to maintain existing systems in service.
  4. Verify that abandoned services serve only abandoned facilities.
  5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.
- E. Protect existing work to remain.
  1. Prevent movement of structure; provide shoring and bracing if necessary.
  2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
  3. Repair adjacent construction and finishes damaged during removal work.
- F. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
- G. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- H. Refinish existing surfaces as indicated:
  1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
  2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
- I. Clean existing systems and equipment.
- J. Remove demolition debris and abandoned items from alterations areas and dispose of off-site;

do not burn or bury.

- K. Do not begin new construction in alterations areas before demolition is complete.
- L. Comply with all other applicable requirements of this section.

### **3.06 CUTTING AND PATCHING**

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. Perform whatever cutting and patching is necessary to:
  - 1. Complete the work.
  - 2. Fit products together to integrate with other work.
  - 3. Provide openings for penetration of mechanical, electrical, and other services.
  - 4. Match work that has been cut to adjacent work.
  - 5. Repair areas adjacent to cuts to required condition.
  - 6. Repair new work damaged by subsequent work.
  - 7. Remove samples of installed work for testing when requested.
  - 8. Remove and replace defective and non-conforming work.
- D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- E. Restore work with new products in accordance with requirements of Contract Documents.
- F. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- G. Patching:
  - 1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
  - 2. Match color, texture, and appearance.
  - 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

### **3.07 PROGRESS CLEANING**

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

### **3.08 PROTECTION OF INSTALLED WORK**

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material



manufacturer.

- G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

### **3.09 SYSTEM STARTUP**

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- D. Verify that wiring and support components for equipment are complete and tested.
- E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- F. Submit a written report that equipment or system has been properly installed and is functioning correctly.

### **3.10 DEMONSTRATION AND INSTRUCTION**

- A. See Section 017900 - Demonstration and Training.

### **3.11 ADJUSTING**

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

### **3.12 FINAL CLEANING**

- A. Use cleaning materials that are nonhazardous.
- B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- E. Clean filters of operating equipment.
- F. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.
- G. Clean site; sweep paved areas, rake clean landscaped surfaces.
- H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

### **3.13 CLOSEOUT PROCEDURES**

- A. Make submittals that are required by governing or other authorities.
- B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.
- C. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.
- D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.
- E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.

- F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- G. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.
- H. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

**END OF SECTION**

**SECTION 017800  
CLOSEOUT SUBMITTALS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Project Record Documents.
- B. Operation and Maintenance Data.
- C. Warranties and bonds.

**1.02 RELATED REQUIREMENTS**

- A. Section 013000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- B. Individual Product Sections: Warranties required for specific products or Work.

**1.03 SUBMITTALS**

- A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
- B. Operation and Maintenance Data:
  - 1. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
  - 2. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
  - 3. Submit two sets of revised final documents in final form within 10 days after final inspection.
- C. Warranties and Bonds:
  - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
  - 2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
  - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

**PART 3 EXECUTION**

**2.01 PROJECT RECORD DOCUMENTS**

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
  - 1. Drawings.
  - 2. Addenda.
  - 3. Change Orders and other modifications to the Contract.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
  - 1. Field changes of dimension and detail.
  - 2. Details not on original Contract drawings.

**2.02 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES**

- A. For Each Product, Applied Material, and Finish:
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and

recommended schedule for cleaning and maintenance.

- C. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

### **2.03 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS**

- A. For Each Item of Equipment and Each System:
  - 1. Description of unit or system, and component parts.
  - 2. Identify function, normal operating characteristics, and limiting conditions.
  - 3. Include performance curves, with engineering data and tests.
  - 4. Complete nomenclature and model number of replaceable parts.
- B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.
- C. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- D. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- E. Provide servicing and lubrication schedule, and list of lubricants required.
- F. Include manufacturer's printed operation and maintenance instructions.
- G. Include sequence of operation by controls manufacturer.
- H. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- I. Additional Requirements: As specified in individual product specification sections.

### **2.04 WARRANTIES AND BONDS**

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.

**END OF SECTION**

**SECTION 017900  
DEMONSTRATION AND TRAINING**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Demonstration of products and systems where indicated in specific specification sections.
- B. Training of Owner personnel in operation and maintenance is required for:
  - 1. All software-operated systems.
  - 2. HVAC systems and equipment.
  - 3. Plumbing equipment.
  - 4. Electrical systems and equipment.
  - 5. Items specified in individual product Sections.
- C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
  - 1. Items specified in individual product Sections.

**1.02 RELATED REQUIREMENTS**

- A. Section 017800 - Closeout Submittals: Operation and maintenance manuals.
- B. Other Specification Sections: Additional requirements for demonstration and training.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Training Plan: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
  - 1. Submit to Architect for transmittal to Owner.
- C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
  - 1. Include applicable portion of O&M manuals.
  - 2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
  - 3. Provide one extra copy of each training manual to be included with operation and maintenance data.

**1.04 QUALITY ASSURANCE**

- A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
  - 1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
  - 2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 DEMONSTRATION - GENERAL**

- A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.
- B. Demonstration may be combined with Owner personnel training if applicable.
- C. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
  - 1. Perform demonstrations not less than two weeks prior to Substantial Completion.
  - 2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

- D. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
  - 1. Perform demonstrations not less than two weeks prior to Substantial Completion.

### **3.02 TRAINING - GENERAL**

- A. Conduct training on-site unless otherwise indicated.
- B. Owner will provide classroom and seating at no cost to Contractor.
- C. Provide training in minimum two hour segments.
- D. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time.
- E. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
  - 1. The location of the O&M manuals and procedures for use and preservation; backup copies.
  - 2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
  - 3. Typical uses of the O&M manuals.
- F. Product- and System-Specific Training:
  - 1. Review the applicable O&M manuals.
  - 2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
  - 3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
  - 4. Provide hands-on training on all operational modes possible and preventive maintenance.
  - 5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
  - 6. Discuss common troubleshooting problems and solutions.
  - 7. Discuss any peculiarities of equipment installation or operation.
  - 8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
  - 9. Review recommended tools and spare parts inventory suggestions of manufacturers.
  - 10. Review spare parts and tools required to be furnished by Contractor.
  - 11. Review spare parts suppliers and sources and procurement procedures.
- G. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

**END OF SECTION**

## **SECTION 024100 DEMOLITION**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Selective demolition of building elements for alteration purposes.

#### **1.02 REFERENCE STANDARDS**

- A. 29 CFR 1926 - Safety and Health Regulations for Construction; Current Edition.
- B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2022, with Errata (2021).

### **PART 3 EXECUTION**

#### **2.01 SCOPE**

- A. Remove all items as specified on Drawing Sheets.

#### **2.02 GENERAL PROCEDURES AND PROJECT CONDITIONS**

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
  - 1. Obtain required permits.
  - 2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
  - 3. Provide, erect, and maintain temporary barriers and security devices.
  - 4. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
  - 5. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
  - 6. Do not close or obstruct roadways or sidewalks without permit.
  - 7. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.
- B. Do not begin removal until receipt of notification to proceed from Owner.
- C. Protect existing structures and other elements that are not to be removed.
  - 1. Provide bracing and shoring.
  - 2. Prevent movement or settlement of adjacent structures.
  - 3. Stop work immediately if adjacent structures appear to be in danger.
- D. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

#### **2.03 EXISTING UTILITIES**

- A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- E. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

#### **2.04 SELECTIVE DEMOLITION FOR ALTERATIONS**

- A. Drawings showing existing construction and utilities are based on casual field observation and

existing record documents only.

1. Verify that construction and utility arrangements are as shown.
  2. Report discrepancies to Architect before disturbing existing installation.
  3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Remove existing work as indicated and as required to accomplish new work.
1. Remove items indicated on drawings.
- C. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
1. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
  2. Verify that abandoned services serve only abandoned facilities before removal.
  3. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.
- D. Protect existing work to remain.
1. Prevent movement of structure; provide shoring and bracing if necessary.
  2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
  3. Repair adjacent construction and finishes damaged during removal work.
  4. Patch as specified for patching new work.

## **2.05 DEBRIS AND WASTE REMOVAL**

- A. Remove debris, junk, and trash from site.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

**END OF SECTION**



**SECTION 030516  
UNDERSLAB VAPOR BARRIER**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Sheet vapor barrier under concrete slabs on grade.

**1.02 RELATED REQUIREMENTS**

- A. Section 033000 - Cast-in-Place Concrete: Preparation of subgrade, granular fill, placement of concrete.

**1.03 REFERENCE STANDARDS**

- A. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2018a.
- B. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2017 (Reapproved 2023).

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products.
- C. Test Data: Submit report of tests showing compliance with specified requirements.
- D. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent construction.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Underslab Vapor Barrier:
  - 1. Water Vapor Permeance: Not more than 0.010 perms, maximum.
  - 2. Thickness: 15 mils.
  - 3. Basis of Design:
    - a. Stego Industries LLC; Stego Wrap Vapor Barrier (15-mil): [www.stegoindustries.com/#sle](http://www.stegoindustries.com/#sle).
    - b. Vapor Block by Raven Industries.
    - c. Substitutions: See Section 016000 - Product Requirements.
- B. Accessory Products: Vapor barrier manufacturer's recommended tape, adhesive, mastic, etc., for sealing seams and penetrations in vapor barrier.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that surface over which vapor barrier is to be installed is complete and ready before proceeding with installation of vapor barrier.

**3.02 INSTALLATION**

- A. Install vapor barrier in accordance with manufacturer's instructions and ASTM E1643.
- B. Install vapor barrier under interior slabs on grade; lap sheet over footings and seal to foundation walls.
- C. Lap joints minimum 6 inches.
- D. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions.
- E. No penetration of vapor barrier is allowed except for reinforcing steel and permanent utilities.
- F. Repair damaged vapor retarder before covering with other materials.

**END OF SECTION**

**SECTION 033000  
CAST-IN-PLACE CONCRETE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Concrete formwork.
- B. Slabs-on-grade.
- C. Concrete foundation walls and footings.
- D. Concrete reinforcement.
- E. Joint devices associated with concrete work.
- F. Concrete curing.

**1.02 REFERENCE STANDARDS**

- A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; American Concrete Institute International; 2010.
- B. ACI 301 - Specifications for Structural Concrete; American Concrete Institute International; 2010.
- C. ACI 302.1R - Guide for Concrete Floor and Slab Construction; American Concrete Institute International; 2004 (Errata 2007).
- D. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International; 2000.
- E. ACI 308R - Guide to Curing Concrete; American Concrete Institute International; 2001 (Reapproved 2008).
- F. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute International; 2011.
- G. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Billet-Steel Bars for Concrete Reinforcement; 2013.
- H. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.
- I. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2012a.
- J. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2013.
- K. ASTM C150/C150M - Standard Specification for Portland Cement; 2012.
- L. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2012.
- M. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2012.

**1.03 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
- C. Mix Design: Submit proposed concrete mix designs.

**1.04 QUALITY ASSURANCE**

- A. Perform work of this section in accordance with ACI 301 and ACI 318.

**PART 2 PRODUCTS**

**2.01 FORMWORK**

- A. Form Materials: Contractor's choice of standard products with sufficient strength to withstand

hydrostatic head without distortion in excess of permitted tolerances.

1. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.

## **2.02 REINFORCEMENT**

- A. Reinforcing Steel: ASTM A615/A615M Grade 60 (420).
  1. Type: Deformed billet-steel bars.
  2. Finish: Unfinished, unless otherwise indicated.
- B. Reinforcement Accessories:
  1. Tie Wire: Annealed, minimum 16 gage (1.5 mm).
  2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

## **2.03 CONCRETE MATERIALS**

- A. Cement: ASTM C150, Type I - Normal Portland type.
  1. Acquire all cement for entire project from same source.
- B. Fine and Coarse Aggregates: ASTM C 33.
  1. Acquire all aggregates for entire project from same source.
- C. Fly Ash: ASTM C618, Class C or F.
- D. Water: Clean and not detrimental to concrete.
- E. Fiber Reinforcement: Alkali-resistant polypropylene complying with ASTM C1116/C1116M.
  1. Fiber Length: 0.25 inch (6 mm), nominal.

## **2.04 BONDING AND JOINTING PRODUCTS**

- A. Slab Isolation Joint Filler: 1/2 inch (13 mm) thick, height equal to slab thickness, with removable top section that will form 1/2 inch (13 mm) deep sealant pocket after removal.

## **2.05 CONCRETE MIX DESIGN**

- A. Fiber Reinforcement: Add to mix at rate of 1.5 pounds per cubic yard (0.89 kg per cubic meter), or as recommended by manufacturer for specific project conditions.
- B. Footings and Foundation Walls:
  1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 3,500 pounds per square inch (20.7 MPa).
  2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
  3. Water-Cement Ratio: Maximum 45 percent by weight.
  4. Total Air Content: 6 percent plus or minus 1.5 percent at point of delivery, determined in accordance with ASTM C173/C173M.
  5. Maximum Slump: 4 inches (100 mm), plus or minus 1 inch (25 mm).
  6. Maximum Aggregate Size: 1-inch (25 mm).
- C. Slabs-on-Grade:
  1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4,000 pounds per square inch (31 MPa).
  2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
  3. Minimum Cementitious Materials Content: 520 lb/cu. yd (309 kg/cu. m).
  4. Total Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
  5. Maximum Slump: 4 inches (100 mm), plus or minus 1 inch (25 mm).
  6. Maximum Aggregate Size: ¾-inch (19 mm).

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify lines, levels, and dimensions before proceeding with work of this section.

### **3.02 PREPARATION**

- A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
- B. Verify that forms are clean and free of rust before applying release agent.
- C. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.
- D. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Lap joints minimum 6 inches (150 mm). Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.

### **3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS**

- A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

### **3.04 PLACING CONCRETE**

- A. Place concrete in accordance with ACI 304R.
- B. Place concrete for floor slabs in accordance with ACI 302.1R.
- C. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

### **3.05 SLAB JOINTING**

- A. Locate joints as indicated on the drawings.
- B. Anchor joint fillers and devices to prevent movement during concrete placement.
- C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.
- D. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch (5 mm) thick blade and cut at least 1 inch (25 mm) deep but not less than one quarter (1/4) the depth of the slab.

### **3.06 FLOOR FLATNESS AND LEVELNESS TOLERANCES**

- A. Maximum Variation of Surface Flatness:
  - 1. Exposed Concrete Floors: 1/4 inch (6 mm) in 10 ft (3 m).
  - 2. Under Seamless Resilient Flooring: 1/4 inch (6 mm) in 10 ft (3 m).
  - 3. Under Carpeting: 1/4 inch (6 mm) in 10 ft (3 m).
- B. Correct the slab surface if tolerances are less than specified.
- C. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

### **3.07 CONCRETE FINISHING**

- A. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
  - 1. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in ACI 302.1R; thin floor coverings include carpeting, resilient flooring, seamless flooring, thin set quarry tile, and thin set ceramic tile.
  - 2. Decorative Exposed Surfaces: "Steel trowel" as described in ACI 302.1R; use steel-reinforced plastic trowel blades instead of steel blades to avoid black-burnish marks; decorative exposed surfaces include surfaces to be stained or dyed, pigmented concrete, surfaces to be polished, and all other slab surfaces.

### **3.08 CURING AND PROTECTION**

- A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Surfaces Not in Contact with Forms:
  - 1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
  - 2. Final Curing: Begin after initial curing but before surface is dry.

### **3.09 DEFECTIVE CONCRETE**

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

### **3.10 PROTECTION**

- A. Do not permit traffic over unprotected concrete floor surface until fully cured.

### **3.11 FIELD QUALITY CONTROL**

- A. Owner will engage a qualified testing and inspecting agency to perform field tests and inspection and to prepare test reports.

**END OF SECTION**

**SECTION 042000  
UNIT MASONRY**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Concrete Block.
- B. Accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 055000 - Metal Fabrications: Loose steel lintels.
- B. Section 061000 - Rough Carpentry: Nailing strips built into masonry.
- C. Section 079200 - Joint Sealants: Sealing control and expansion joints.

**1.03 REFERENCE STANDARDS**

- A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata (2024).
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.
- D. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2022.
- E. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2023.
- F. ASTM C91/C91M - Standard Specification for Masonry Cement; 2023.
- G. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units; 2023.
- H. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2018.
- I. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.
- J. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2024.
- K. ASTM C476 - Standard Specification for Grout for Masonry; 2023.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all relevant installers.

**1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.
- C. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 016000 - Product Requirements, for additional provisions.

**1.06 QUALITY ASSURANCE**

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of the contract documents.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of documented experience.

**1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and

contamination by other materials.

## **PART 2 PRODUCTS**

### **2.01 CONCRETE MASONRY UNITS**

- A. Concrete Block: Comply with referenced standards and as follows:
  - 1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depths as indicated on drawings for specific locations.
  - 2. Special Shapes: Provide non-standard blocks configured for corners.
    - a. Provide bullnose units for outside corners.
  - 3. Load-Bearing Units: ASTM C90, normal weight.
    - a. Hollow block, as indicated.
    - b. Exposed Faces: Manufacturer's standard color and texture where indicated.
  - 4. Non-Loadbearing Units: ASTM C129.
    - a. Hollow block, as indicated.

### **2.02 MORTAR AND GROUT MATERIALS**

- A. Masonry Cement: ASTM C91/C91M, Type N.
- B. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.
  - 1. Not more than 0.60 percent alkali.
- C. Mortar Aggregate: ASTM C144.
- D. Grout Aggregate: ASTM C404.
- E. Water: Clean and potable.

### **2.03 ACCESSORIES**

- A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
  - 1. Manufacturers:
    - a. Blok-Lok Limited: [www.blok-lok.com/#sle](http://www.blok-lok.com/#sle).
    - b. Hohmann & Barnard, Inc: [www.h-b.com/#sle](http://www.h-b.com/#sle).
    - c. WIRE-BOND: [www.wirebond.com/#sle](http://www.wirebond.com/#sle).
- B. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

### **2.04 MORTAR AND GROUT MIXES**

- 1. Exterior, non-loadbearing masonry: Type N.
- 2. Interior, loadbearing masonry: Type N.
- 3. Interior, non-loadbearing masonry: Type O.
- B. Grout: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.
- C. Admixtures: Add to mixture at manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.
- D. Mixing: Use mechanical batch mixer and comply with referenced standards.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

### **3.02 PREPARATION**

- A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

### **3.03 COLD AND HOT WEATHER REQUIREMENTS**

- A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
- B. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

### **3.04 COURSING**

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Concrete Masonry Units:
  - 1. Bond: Running.
  - 2. Coursing: One unit and one mortar joint to equal 8 inches.
  - 3. Mortar Joints: Concave.

### **3.05 PLACING AND BONDING**

- A. Lay hollow masonry units with face shell bedding on head and bed joints.
- B. Remove excess mortar and mortar smears as work progresses.
- C. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.
- D. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- E. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- F. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.
- G. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

### **3.06 REINFORCEMENT AND ANCHORAGE - GENERAL**

- A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches.

### **3.07 LINTELS**

- A. Install loose steel lintels over openings.

### **3.08 CONTROL AND EXPANSION JOINTS**

- A. Do not continue horizontal joint reinforcement through control or expansion joints.
- B. Form control joint with a sheet building paper bond breaker fitted to one side of the hollow contour end of the block unit. Fill the resultant core with grout fill. Rake joint at exposed unit faces for placement of backer rod and sealant.
- C. Size control joints as indicated on drawings; if not indicated, 3/4 inch wide and deep.
- D. Form expansion joint as detailed on drawings.



### **3.09 BUILT-IN WORK**

- A. As work progresses, install built-in metal door frames and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.
- C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
- D. Do not build into masonry construction organic materials that are subject to deterioration.

### **3.10 TOLERANCES**

- A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
- B. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
- C. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- D. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- E. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.
- F. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

### **3.11 CUTTING AND FITTING**

- A. Cut and fit for chases. Coordinate with other sections of work to provide correct size, shape, and location.
- B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

### **3.12 CLEANING**

- A. Remove excess mortar and mortar droppings.
- B. Clean soiled surfaces with cleaning solution.

### **3.13 PROTECTION**

- A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

**END OF SECTION**

**SECTION 061000  
ROUGH CARPENTRY**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Nonstructural dimension lumber framing.
- B. Rough opening framing for doors, windows, and roof openings.
- C. Concealed wood blocking, nailers, and supports.

**1.02 REFERENCE STANDARDS**

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.
- C. AWC (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings; 2024, with Errata.
- D. PS 20 - American Softwood Lumber Standard; 2025.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.
- C. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

**1.04 DELIVERY, STORAGE, AND HANDLING**

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

**PART 2 PRODUCTS**

**2.01 GENERAL REQUIREMENTS**

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
  - 1. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
  - 2. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at [www.alsc.org](http://www.alsc.org), and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

**2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS**

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: S-dry or MC19.
- C. Stud Framing (2 by 2 through 2 by 6 ):
  - 1. Grade: No. 2.
- D. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
  - 1. Lumber: S4S, No. 2 or Standard Grade.
  - 2. Boards: Standard or No. 3.

**2.03 ACCESSORIES**

- A. Fasteners and Anchors:
  - 1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for

high humidity and preservative-treated wood locations, unfinished steel elsewhere.

### **PART 3 EXECUTION**

#### **3.01 PREPARATION**

- A. Coordinate installation of rough carpentry members specified in other sections.

#### **3.02 INSTALLATION - GENERAL**

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

#### **3.03 FRAMING INSTALLATION**

- A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
- B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.
- C. Install structural members full length without splices unless otherwise specifically detailed.
- D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes, AWC (WFCM) Wood Frame Construction Manual, and \_\_\_\_\_.
- E. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.
- F. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

#### **3.04 BLOCKING, NAILERS, AND SUPPORTS**

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to authorities having jurisdiction may be used in lieu of solid wood blocking.
- C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.
- D. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- E. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- F. Provide the following specific nonstructural framing and blocking:
  - 1. Cabinets and shelf supports.
  - 2. Wall brackets.
  - 3. Handrails.
  - 4. Grab bars.
  - 5. Towel and bath accessories.
  - 6. Wall-mounted door stops.
  - 7. Chalkboards and marker boards.
  - 8. Wall paneling and trim.
  - 9. Joints of rigid wall coverings that occur between studs.

#### **3.05 TOLERANCES**

- A. Framing Members: 1/4 inch from true position, maximum.

- B. Variation from Plane, Other than Floors: 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

**3.06 CLEANING**

- A. Do not leave wood, shavings, sawdust, etc. on the ground.
- B. Prevent sawdust and wood shavings from entering the drainage system.

**END OF SECTION**

**SECTION 064100**  
**ARCHITECTURAL WOOD CASEWORK**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Specially fabricated cabinet units.
- B. Cabinet hardware.

**1.02 REFERENCE STANDARDS**

- A. BHMA A156.9 - Cabinet Hardware; 2020.
- B. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
- C. BHMA A156.9 - American National Standard for Cabinet Hardware; Builders Hardware Manufacturers Association; 2010 (ANSI/BHMA A156.9).
- D. NEMA LD 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association; 2005.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
  - 1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
- C. Product Data: Provide data for hardware accessories.

**1.04 QUALITY ASSURANCE**

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Protect units from moisture damage.

**1.06 FIELD CONDITIONS**

- A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

**PART 2 PRODUCTS**

**2.01 CABINETS**

- A. Cabinets:
  - 1. Finish - Exposed Exterior Surfaces: Decorative laminate.
  - 2. Finish - Concealed Surfaces: Manufacturer's option.
  - 3. Door and Drawer Front Edge Profiles: 3 mm edge band.
  - 4. Adjustable Shelf Loading: 50 lbs. per sq. ft.
  - 5. Cabinet Style: Flush overlay.
  - 6. Drawer Side Construction: Doweled.
  - 7. Drawer Construction Technique: Dowel joints.

**2.02 WOOD-BASED COMPONENTS**

- A. Wood fabricated from old growth timber is not permitted.

**2.03 LAMINATE MATERIALS**

- A. Manufacturers:
  - 1. Formica Corporation: [www.formica.com/#sle](http://www.formica.com/#sle).
  - 2. Substitutions: See Section 016000 - Product Requirements.
- B. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.

## 2.04 COUNTERTOPS

- A. Countertops are specified in Section 123600.

## 2.05 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Plastic Edge Banding: Extruded PVC, flat shaped; smooth finish; self locking serrated tongue; of width to match component thickness.
  - 1. Color: As selected by Architect from manufacturer's standard range.
- C. Acrylic Resin Panels: 3form Chroma. See Finish Schedule for colors
- D. Fasteners: Size and type to suit application.
- E. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and chrome-plated finish in exposed locations.
- F. Concealed Joint Fasteners: Threaded steel.
- G. Grommets: Standard plastic grommets for cut-outs, in color to match adjacent surface.

## 2.06 HARDWARE

- A. Hardware: BHMA A156.9, types as recommended by fabricator for quality grade specified.
- B. Adjustable Shelf Supports: Standard back-mounted system using surface mounted metal shelf standards and coordinated cantilevered shelf brackets, satin chrome, painted, or painted finish, for nominal 1 inch spacing adjustments.
- C. Countertop Supports:
  - 1. Material: Aluminum
  - 2. Finish/Color: Black powdercoat.
  - 3. Manufacturers:
    - a. Rakks/Rangine Corporation; Sill Supports: [www.rakks.com/#sle](http://www.rakks.com/#sle)
- D. Drawer and Door Pulls: "U" shaped wire pull, steel with chrome finish, 4 inch centers.
- E. Cabinet Locks: Keyed cylinder, two keys per lock, master keyed, steel with chrome finish.
- F. Catches: Magnetic.
- G. Drawer Slides:
  - 1. Type: Extension types as scheduled.
  - 2. Static Load Capacity: Commercial grade.
  - 3. Mounting: Side mounted.
  - 4. Stops: Integral type.
  - 5. Manufacturers
    - a. Accuride International, Inc: [www accuride.com](http://www accuride.com).
    - b. Grass America Inc: [www.grassusa.com](http://www.grassusa.com).
    - c. Hettich America, LP: [www.hettichamerica.com](http://www.hettichamerica.com).
    - d. Knappe & Vogt Manufacturing Company: [www.knapeandvogt.com](http://www.knapeandvogt.com).
    - e. Substitutions: See Section 016000 - Product Requirements.
- H. Hinges: European style concealed self-closing type, steel with polished finish.
  - 1. Manufacturers:
    - a. Grass America Inc: [www.grassusa.com](http://www.grassusa.com).
    - b. Hardware Resources: [www.hardwareresources.com](http://www.hardwareresources.com).
    - c. Hettich America, LP; Sensys: [www.hettichamerica.com/#sle](http://www.hettichamerica.com/#sle).
    - d. Julius Blum, Inc: [www.blum.com](http://www.blum.com).
    - e. Substitutions: See Section 016000 - Product Requirements.

## 2.07 FABRICATION

- A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.

- B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- D. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners.
  - 1. Cap exposed plastic laminate finish edges with material of same finish and pattern.
- E. Mechanically fasten back splash to countertops as recommended by laminate manufacturer at 16 inches on center.
- F. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this section.

#### **3.02 INSTALLATION**

- A. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- B. Use fixture attachments in concealed locations for wall mounted components.
- C. Use concealed joint fasteners to align and secure adjoining cabinet units.
- D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.

#### **3.03 ADJUSTING**

- A. Adjust installed work.
- B. Adjust moving or operating parts to function smoothly and correctly.

#### **3.04 CLEANING**

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

**END OF SECTION**

## **SECTION 079000 JOINT SEALANTS**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Precompressed foam sealers.

#### **1.02 REFERENCE STANDARDS**

- A. ASTM C834 - Standard Specification for Latex Sealants; 2017 (Reapproved 2023).
- B. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2022.
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- D. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).
- E. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2015 (Reapproved 2021).

#### **1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate the work with other sections referencing this section.

#### **1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating sealant chemical characteristics.
- C. Samples: Submit two samples, 1/2 x 1/2 inch in size illustrating sealant colors for selection.
- D. Manufacturer's Installation Instructions: Indicate special procedures.

#### **1.05 FIELD CONDITIONS**

- A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

#### **1.06 WARRANTY**

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Gunnable and Pourable Sealants:
  - 1. Adhesives Technology Corporation: [www.atc.ws](http://www.atc.ws).
  - 2. BASF Construction Chemicals-Building Systems: [www.buildingsystems.basf.com](http://www.buildingsystems.basf.com).
  - 3. Bostik Inc: [www.bostik-us.com](http://www.bostik-us.com).
  - 4. ARDEX Engineered Cements: [www.ardexamericas.com](http://www.ardexamericas.com).
  - 5. Dow Corning Corporation: [www.dowcorning.com](http://www.dowcorning.com).
  - 6. Hilti, Inc: [www.us.hilti.com](http://www.us.hilti.com).
  - 7. Momentive Performance Materials, Inc (formerly GE Silicones): [www.momentive.com](http://www.momentive.com).
  - 8. Pecora Corporation: [www.pecora.com](http://www.pecora.com).
  - 9. The QUIKRETE Companies: [www.quikrete.com](http://www.quikrete.com).
  - 10. Red Devil: [www.reddevil.com](http://www.reddevil.com).
  - 11. Tremco Global Sealants: [www.tremcosealants.com](http://www.tremcosealants.com).
  - 12. Sherwin-Williams Company: [www.sherwin-williams.com](http://www.sherwin-williams.com).
  - 13. Sika Corporation: [www.usa-sika.com](http://www.usa-sika.com).
  - 14. W.R. Meadows, Inc: [www.wrmeadows.com](http://www.wrmeadows.com).
  - 15. Substitutions: See Section 016000 - Product Requirements.



- B. Preformed Compressible Foam Sealers:
  1. EMSEAL Joint Systems, Ltd: [www.emseal.com](http://www.emseal.com).
  2. Sandell Manufacturing Company, Inc: [www.sandellmfg.com](http://www.sandellmfg.com).
  3. Dayton Superior Corporation: [www.daytonsuperior.com](http://www.daytonsuperior.com).
  4. Tremco Global Sealants: [www.tremcosealants.com](http://www.tremcosealants.com).
  5. Substitutions: See Section 016000 - Product Requirements.

## 2.02 SEALANTS

- A. General Purpose Exterior Sealant: Polyurethane; ASTM C920, Grade NS, Class 25 minimum; Uses M, G, and A; single component.
  1. Color: To be selected by Architect from manufacturer's standard range.
  2. Applications: Use for:
    - a. Control, expansion, and soft joints in masonry.
    - b. Joints between concrete and other materials.
    - c. Joints between metal frames and other materials.
    - d. Other exterior joints for which no other sealant is indicated.
- B. Exterior Metal Lap Joint Sealant: Butyl or polyisobutylene, nondrying, nonskinning, noncuring.
  1. Applications: Use for:
    - a. Concealed sealant bead in sheet metal work.
    - b. Concealed sealant bead in siding overlaps.
- C. General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, Type OP, Grade NF single component, paintable.
  1. Color: To be selected by Architect from manufacturer's full range.
  2. Applications: Use for:
    - a. Interior wall and ceiling control joints.
    - b. Joints between door and window frames and wall surfaces.
    - c. Other interior joints for which no other type of sealant is indicated.
- D. Bathtub/Tile Sealant: White silicone; ASTM C920, Uses I, M and A; single component, mildew resistant.
  1. Applications: Use for:
    - a. Joints between plumbing fixtures and floor and wall surfaces.
  2. Products:
    - a. Bostik Inc: [www.bostik-us.com](http://www.bostik-us.com).
    - b. BASF Construction Chemicals-Building Systems: [www.buildingsystems.basf.com](http://www.buildingsystems.basf.com).
    - c. Pecora Corporation; 898NST Sanitary Silicone Sealant - Class 50: [www.pecora.com](http://www.pecora.com).
    - d. Tremco Global Sealants: [www.tremcosealants.com](http://www.tremcosealants.com).
    - e. Substitutions: See Section 016000 - Product Requirements.
- E. Acoustical Sealant for Concealed Locations:
  1. Composition: Acrylic latex emulsion sealant.
  2. Applications: Use for concealed locations only:
    - a. Sealant bead between top stud runner and structure and between bottom stud track and floor.
  3. Products:
    - a. Bostik Inc: [www.bostik-us.com](http://www.bostik-us.com).
    - b. Pecora Corporation; AIS-919 Acoustical and Insulation Latex Sealant: [www.pecora.com](http://www.pecora.com).
    - c. BASF Construction Chemicals-Building Systems: [www.buildingsystems.basf.com](http://www.buildingsystems.basf.com).
    - d. Tremco Global Sealants: [www.tremcosealants.com](http://www.tremcosealants.com).
    - e. Hilti, Inc.; CP 506 Smoke and Acoustical Sealant: [www.us.hilti.com](http://www.us.hilti.com).
    - f. Substitutions: See Section 016000 - Product Requirements.
- F. Polyurea Concrete Floor Joint Filler: Self-leveling, pourable, semi-rigid sealant intended for filling cracks and control joints not subject to significant movement; rigid enough to support

concrete edges under traffic.

1. Composition: Single or multi-part, 100 percent solids by weight.
2. Hardness: 75, minimum, after 7 days, when tested in accordance with ASTM D2240 Shore A.

### **2.03 ACCESSORIES**

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: Round foam rod compatible with sealant; ASTM D 1667, closed cell PVC; oversized 30 to 50 percent larger than joint width.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that substrate surfaces are ready to receive work.
- B. Verify that joint backing and release tapes are compatible with sealant.

### **3.02 PREPARATION**

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean and prime joints in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Protect elements surrounding the work of this section from damage or disfigurement.

### **3.03 INSTALLATION**

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Perform acoustical sealant application work in accordance with ASTM C919.
- D. Install bond breaker where joint backing is not used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- G. Tool joints concave.
- H. Concrete Floor Joint Filler: Install concrete floor joint filler per manufacturer's written instructions. After floor joint filler is fully cured, shave joint filler flush with top of concrete slab.

### **3.04 CLEANING**

- A. Clean adjacent soiled surfaces.

### **3.05 PROTECTION**

- A. Protect sealants until cured.

**END OF SECTION**

**SECTION 081113  
HOLLOW METAL DOORS AND FRAMES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Non-fire-rated hollow metal doors and frames.
- B. Hollow metal frames for wood doors.

**1.02 RELATED REQUIREMENTS**

- A. Section 087100 - Door Hardware.

**1.03 REFERENCE STANDARDS**

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.
- C. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2024.
- D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2023.
- E. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2020.
- F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- G. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2023, with Editorial Revision.
- H. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.
- I. ASTM C1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus; 2011.
- J. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- K. NAAMM HMMA 840 - Guide Specifications for Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2024.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.
- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

**1.05 QUALITY ASSURANCE**

- A. Maintain at project site copies of reference standards relating to installation of products specified.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Hollow Metal Doors and Frames:
  - 1. Curries, an Assa Abloy Group company: [www.assaabloydss.com/#sle](http://www.assaabloydss.com/#sle).
  - 2. De La Fontaine Inc: [www.delafontaine.com/#sle](http://www.delafontaine.com/#sle).
  - 3. Republic Doors: [www.republicdoor.com](http://www.republicdoor.com).
  - 4. Steelcraft, an Allegion brand: [www.allegion.com/#sle](http://www.allegion.com/#sle).
  - 5. Substitutions: See Section 016000 - Product Requirements.

### **2.02 PERFORMANCE REQUIREMENTS**

- A. Requirements for Hollow Metal Doors and Frames:
  - 1. Steel Sheet: Comply with one or more of the following requirements; galvanized steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
  - 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
  - 3. Finish: Factory primed, for field finishing.
- B. Energy Efficient Exterior Openings: Comply with minimum thermal ratings, based on ASTM C1363. Openings to be fabricated and tested as fully operable, thermal insulating door and frame assemblies.
  - 1. Thermal Performance (Exterior Openings): Independent testing laboratory certification for exterior door assemblies being tested in accordance with ASTM C1363 and meet or exceed the following requirements:
    - a. Door Assembly Operable U-Factor and R-Value Ratings: U-Factor 0.395, R-Value 2.53, including insulated door, thermal-break frame and threshold.
  - 2. Air Infiltration (Exterior Openings): Independent testing laboratory certification for exterior door assemblies being tested in accordance with ASTM E283 to meet or exceed the following requirements:
    - a. Rate of leakage of the door assembly shall not exceed 0.25 cfm per square foot of static differential air pressure of 1.567 psf (equivalent to 25 mph wind velocity).
- C. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

### **2.03 HOLLOW METAL DOORS**

- A. Exterior Doors: Thermally insulated.
  - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    - a. Level 1 - Standard-duty.
    - b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
    - c. Model 1 - Full Flush.
    - d. Door Face Metal Thickness: 20 gage, 0.032 inch, minimum.
  - 2. Door Thickness: 1-3/4 inch, nominal.
  - 3. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvanized) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness.
  - 4. Insulating Value: U-value of 0.50, when tested in accordance with ASTM C1363.
- B. Interior Doors, Non-Fire-Rated:
  - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    - a. Level 1 - Standard-duty.
    - b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
    - c. Model 1 - Full Flush.
    - d. Door Face Metal Thickness: 20 gage, 0.032 inch, minimum.

2. Door Thickness: 1-3/4 inch, nominal.

#### **2.04 HOLLOW METAL FRAMES**

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. General:
  1. Comply with the requirements of grade specified for corresponding door, except:
    - a. Frames for Wood Doors: Comply with frame requirements in accordance with ANSI/SDI A250.8 (SDI-100), Level 1, 18 gage, 0.042 inch, minimum thickness.
  2. Finish: Same as for door.
  3. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
- C. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
- D. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.
- E. Mullions for Pairs of Doors: Fixed, with profile similar to jambs.

#### **2.05 FINISHES**

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

#### **2.06 ACCESSORIES**

- A. Grout for Frames: Portland cement grout with maximum 4 inch slump for hand troweling; thinner pumpable grout is prohibited.
- B. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
- C. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

#### **2.07 FINISHES**

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
- B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

#### **3.02 PREPARATION**

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

#### **3.03 INSTALLATION**

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Coordinate frame anchor placement with wall construction.
- C. Install door hardware as specified in Section 087100.
- D. Comply with glazing installation requirements of Section 088000.

#### **3.04 TOLERANCES**

- A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

#### **3.05 ADJUSTING**

- A. Adjust for smooth and balanced door movement.

**3.06 SCHEDULE**

A. Refer to Door and Frame Schedule on the drawings.

**END OF SECTION**

**SECTION 081416  
FLUSH WOOD DOORS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Flush wood doors; flush configuration; fire rated and non-rated.

**1.02 RELATED REQUIREMENTS**

- A. Section 081113 - Hollow Metal Doors and Frames.
- B. Section 087100 - Door Hardware.

**1.03 REFERENCE STANDARDS**

- A. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2025.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
- D. Specimen warranty.
- E. Samples: Submit two samples of door veneer, 6 by 6 inch in size illustrating wood grain, stain color, and sheen.
- F. Manufacturer's Installation Instructions: Indicate special installation instructions.

**1.05 QUALITY ASSURANCE**

- A. Maintain one copy of the specified door quality standard on site for review during installation and finishing.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than three years of documented experience.
- C. Accept doors on site in manufacturer's packaging. Inspect for damage.
- D. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

**1.06 WARRANTY**

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Interior Doors: Provide manufacturer's warranty for the life of the installation.
- C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Wood Veneer Faced Doors:
  - 1. Graham Wood Doors: [www.grahamdoors.com](http://www.grahamdoors.com).
  - 2. VT Industries, Inc; \_\_\_\_: [www.vtindustries.com/#sle](http://www.vtindustries.com/#sle).
  - 3. Substitutions: See Section 016000 - Product Requirements.

**2.02 DOORS AND PANELS**

- A. Doors: Refer to drawings for locations and additional requirements.
  - 1. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.
- B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
  1. Provide solid core doors at each location, \_\_\_\_\_.
  2. Wood veneer facing with factory transparent finish matching sample provided by Architect.

### **2.03 DOOR AND PANEL CORES**

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.
- B. Fire-Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

### **2.04 DOOR FACINGS**

- A. Veneer Facing for Transparent Finish: Red oak, veneer grade in accordance with quality standard indicated, rift cut (only red and white oak), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.

### **2.05 DOOR CONSTRUCTION**

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores Constructed with stiles and rails:
  1. Provide solid blocks at lock edge for hardware reinforcement.
  2. Provide solid blocking for other throughbolted hardware.
- C. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- D. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- E. Provide edge clearances in accordance with the quality standard specified.

### **2.06 FACTORY FINISHING - WOOD VENEER DOORS**

- A. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
  1. Transparent:
    - a. System - 1, Lacquer, Nitrocellulose.
    - b. Sheen: Flat.
- B. Factory finish doors in accordance with sample to be provided.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

### **3.02 INSTALLATION**

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
  1. Install fire-rated doors in accordance with NFPA 80 requirements.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Use machine tools to cut or drill for hardware.
- D. Coordinate installation of doors with installation of frames and hardware.

### **3.03 TOLERANCES**

- A. Comply with specified quality standard for fit and clearance tolerances.



B. Comply with specified quality standard for telegraphing, warp, and squareness.

**3.04 ADJUSTING**

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

**END OF SECTION**

**SECTION 087100  
DOOR HARDWARE**

**PART 1 - GENERAL**

**1.1 CONDITIONS**

- A. Conditions of the contract (General and Supplementary Conditions) and Division 01 - General Requirements, govern the work of this section.
- B. This section includes all material, and related service necessary to furnish all finish hardware indicated on the drawings or specified herein.
- C. Furnish UL listed hardware for all labeled and 20 min. openings in conformance with the requirements for the class of opening scheduled. Underwriters' requirements shall have precedence over specification where conflicts exist.
- D. All work shall be in accordance with all applicable state and local building codes. Code requirements shall have precedence over this specification where conflicts exist.

**1.2 WORK INCLUDED**

- A. This section includes the following:
  - 1. Furnish door hardware (for hollow metal, and wood doors) specified herein, listed in the hardware schedule, and/or required by the drawings.
  - 2. Cylinders for Aluminum Doors
  - 3. Thresholds and Weather-stripping (Aluminum frame seals to be provided by aluminum door supplier)
  - 4. Electro-Mechanical Devices
  - 5. Access Control components and or systems specified within this section.
- B. Where items of hardware are not definitely or correctly specified and is required for the intended service, such omission, error or other discrepancy should be directed to the Architect prior to the bid date for clarification by addendum. Otherwise furnish such items in the type and quantity established by this specification for the appropriate service intended.

**1.3 RELATED WORK IN OTHER SECTIONS**

- A. This section includes coordination with related work in the following sections:
  - 1. Division 06 Section "Finish Carpentry".
  - 2. Division 06 Section "Cabinet Hardware"
  - 3. Division 08 Section "Hollow Metal Doors and Frames".
  - 4. Division 08 Section "Wood Doors"
  - 5. Division 08 Section "Storm Doors"
  - 6. Division 08 Section "Aluminum Entrances and Storefronts"
  - 7. Division 26 Sections "Electrical"
  - 8. Division 28 Sections "Electronic Safety and Security".

**1.4 REFERENCES**

- A. Publications of agencies and organizations listed below form a part of this specification section to the extent referenced.
  - 1. DHI – Installation Guide for Doors and Hardware (2020).
  - 2. NFPA 80 - Standards for Fire Doors and Windows.
  - 3. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures.
  - 4. UL - Building Material Directory.
  - 5. DHI - Door and Hardware Institute
  - 6. WHI - Warnock Hersey
  - 7. BHMA - Builders Hardware Manufacturers Association
  - 8. ANSI – American National Standards Institute

9. IBC - International Building Code 2021 Edition (as adopted and amended by local building code)

## 1.5 SUBMITTALS

- A. Within ten days after award of contract, submit detailed hardware schedule in quantities as required by Division 01 - General Requirements.
- B. Schedule format shall be consistent with recommendations for a vertical format as set forth in the Door & Hardware Institute's (DHI) publication "Sequence and Format for the Hardware Schedule". Hardware sets shall be consolidated to group multiple door openings which share similar hardware requirements. Schedule shall include the following information:
  1. Door number, location, size, handing, and rating.
  2. Door and frame material, handing.
  3. Degree of swing.
  4. Manufacturer
  5. Product name and catalog number
  6. Function, type and style
  7. Size and finish of each item
  8. Mounting heights
  9. Explanation of abbreviations, symbols, etc.
  10. Numerical door index, indicating the hardware set/ group number for each door.
- C. When universal type door closers are to be provided, the schedule shall indicate the application method to be used for installation at each door: (regular arm, parallel arm, or top jamb).
- D. The schedule will be prepared under the direct supervision of a certified Architectural Hardware Consultant (AHC), or certified Door Hardware Consultant (DHC) employed by the hardware distributor. The hardware schedule shall be signed and embossed or stamped with the DHI certification seal of the supervising AHC or DHC. The supervising AHC or DHC shall attend any meetings related to the project when requested by the architect.
- E. Check the specified hardware for suitability and adaptability to the details and surrounding conditions.
- F. Review drawings from related trades as required to verify compatibility with specified hardware. Indicate unsuitable or incompatible items, and proposed substitutions in the hardware schedule.
- G. Provide documentation for all hardware to be furnished on labeled fire doors indicating compliance with positive pressure fire testing UL 10C.
- H. Furnish manufacturers' catalog data for each item of hardware in quantities as required by Division 01 - General Requirements.
- I. Submit a sample of each type of hardware requested by the architect. Samples shall be of the same finish, style, and function as specified herein. Tag each sample with its permanent location so that it may be used in the final work.
- J. Furnish with first submittal, a list of required lead times for all hardware items.
- K. After final approved schedule is returned, transmit corrected copies for distribution and field use in quantities as required by Division 01 - General Requirements.
- L. Furnish approved hardware schedules, template lists, and pertinent templates as requested by related trades.
- M. Furnish necessary diagrams, schematics, voltage and amperage requirements for all electro-mechanical devices or systems as required by related trades. Wiring diagrams shall be opening specific and include both a riser diagram and point to point diagram showing all wiring terminations.
- N. After receipt of approved hardware schedule, Hardware supplier shall initiate a meeting including the owner's representative to determine keying requirements. Upon completion of initial key

meeting, hardware supplier shall prepare a proposed key schedule with symbols and abbreviations as set forth in the door and hardware institute's publication "Keying Procedures, Systems, and Nomenclature". Submit copies of owner approved key schedule for review and field use in quantities as required by Division 01 - General Requirements. Wiring diagrams shall be included in final submittals transmitted for distribution of field use.

## **1.6 QUALITY ASSURANCE**

- A. Manufacturers and model numbers listed are to establish a standard of function and quality. Similar items by approved manufacturers that are equal in design, function, and quality, may be considered for prior approval of the architect, provided the required data and physical samples are submitted for approval as set forth in Division 01 - General Requirements.
- B. Where indicated in this specification, products shall be independently certified by ANSI for compliance with relevant ANSI/BHMA standards A156.1 - A156.36 – Standards for Hardware and Specialties. All products shall meet or exceed certification requirements for the respective grade indicated within this specification. Supplier shall provide evidence of certification when requested by the architect.
- C. Obtain each type of hardware (hinges, latch & locksets, exit devices, closers, etc.) from a single manufacturer, although several may be indicated as offering products complying with requirements.
- D. Electrical drawings and electrical specifications are based on the specific electrified hardware components specified in hardware sets. When electronic hardware components other than those indicated in hardware sets are provided, the supplier shall be responsible for all costs incurred by the design team and their consultants to review and revise electrical drawings and electrical specifications. Supplier shall also be responsible for any additional costs associated with required changes in related equipment, materials, installation, or final hook up to ensure the system will operate and function as indicated in the construction documents, including hardware set operational / functional descriptions.
- E. All hardware items shall be manufactured no earlier than 6 months prior to delivery to site.
- F. Hardware supplier shall be factory trained and certified by the manufacture to provide and support all computer managed locks and system components.
- G. Installation of hardware shall be installed or directly supervised and inspected by a skilled installer certified by the manufacturer of locksets, door closers, and exit devices used on the project, or with not less than 3 years' experience in successful completion of projects similar in size and scope.
- H. Provide hardware for all labeled fire doors, which complies with positive pressure fire testing UL 10C.
- I. Comply with all applicable provisions of the standards referenced within section 1.4 of this specification.
- J. Hardware supplier shall participate when reasonably requested to meet with the contractor and or architect to inspect any claim for incorrect or non-functioning materials; following such inspection, the hardware supplier shall provide a written statement documenting the cause and proposed remedy of any unresolved items.

## **1.7 DELIVERY, STORAGE AND HANDLING**

- A. Hardware supplier shall deliver hardware to the job site unless otherwise specified.
- B. All hardware shall be delivered in manufacturers' original cartons and shall be clearly marked with set and door number.
- C. Coordinate with contractor prior to hardware delivery and recommend secure storage and protection against loss and damage at job site.

- D. Contractor shall receive all hardware and provide secure and proper protection of all hardware items to avoid delays caused by lost or damaged hardware. Contractor shall report shortages to the Architect and hardware supplier immediately after receipt of material at the job site.
- E. Coordinate with related trades under the direction of the contractor for delivery of hardware items necessary for factory installation.

**1.8 PRE-INSTALLATION MEETING**

- A. Schedule a hardware pre-installation meeting on site to review and discuss required door operating clearances and the installation of continuous hinges, locksets, door closers, exit devices, overhead stops, and electromechanical door hardware.
- B. Meeting attendees shall be notified 7 days in advance and shall include: Architect, Contractor, Door Hardware Installers (including low voltage hardware), Manufacturers representatives for above hardware items, and any other effected subcontractors or suppliers.
- C. All attendees shall be prepared to distribute installation manuals, hardware schedules, templates, and physical hardware samples.

**1.9 WARRANTY**

- A. All hardware items shall be warranted against defects in material and workmanship as set forth in Division 01 - General Requirements.
- B. Repair, replace, or otherwise correct deficient materials and workmanship without additional cost to owner.

**PART 2 - PRODUCTS**

**2.1 FASTENERS**

- A. All exposed fasteners shall be Phillips head or as otherwise specified and shall match the finish of the adjacent hardware. All fasteners ex-posed to the weather shall be non-ferrous or stainless steel. Furnish correct fasteners to accommodate surrounding conditions.
- B. Coordinate required reinforcements for doors and frames. Seek approval of the architect prior to furnishing through-bolts. Furnish through-bolts as required for materials not readily reinforced.

**2.2 BUTT HINGES**

- A. Acceptable manufacturers and respective catalog numbers:

	<u>Ives</u>	<u>Stanley</u>	<u>Hager</u>	<u>McKinney</u>
1. Standard Weight, Plain Bearing	5PB1	F179	****	T2714
2. Standard Weight, Ball Bearing	5BB1	BB179	BB1279	TB2714
3. Standard Weight, Ball Bearing, Non-Ferrous	5BB1	FBB191	BB1191	TB2314
4. Heavy Weight, Ball Bearing	5BB1HW	FBB168	BB1168	T4B3786
5. Heavy Weight, Ball Bearing, Non-Ferrous	5BB1HW	FBB199	BB1199	T4B3386

- B. Hinges shall be independently certified by ANSI for compliance with ANSI A156.1 (2006). Hinges shall meet or exceed the following ANSI grade requirements as indicated below:
  - 1. Standard Weight, Plain Bearing Hinges: Grade 3
  - 2. Standard Weight, 2 Ball Bearing Hinges: Grade 2
  - 3. Heavy Weight, 4 Ball Bearing Hinges: Grade 1
- C. Unless otherwise specified, furnish the following hinge quantities for each door leaf.
  - 1. 3 hinges for doors up to 90 inches.
  - 2. 1 additional hinge for every 30 inches on doors over 90 inches.
  - 3. 4 hinges for Dutch door applications.
- D. Unless otherwise specified, top and bottom hinges shall be located as specified in Division 08 Section "Hollow Metal Doors and Frames". Intermediate hinges shall be located equidistant from others.

- E. Unless otherwise specified, furnish hinge weight and type as follows:
  1. Standard weight: plain bearing hinge 5PB1 or ball bearing hinge 5BB1 for interior openings through 36 inches wide without a door closer.
  2. Standard weight: ball bearing hinge 5BB1 for interior opening over 36 through 40 inches wide without a door closer, and for interior openings through 40 inches wide with a door closer.
  3. Heavyweight: 4 ball bearing hinge 5BB1HW for interior openings over 40 inches wide, and for all vestibule doors.
  4. Heavyweight: 4 ball bearing hinge 5BB1HWss for exterior openings unless otherwise listed in groups.
  5. Heavyweight: 4 ball bearing hinge 5BB1HWss 5" for all exterior doors or 4 ball bearing hinge 5BB1HW 5" for interior doors, that have an automatic operator.
- F. At existing frames receiving new hinges, match existing hinge size and weight.
- G. Unless otherwise specified, furnish brass, bronze, or stainless-steel base metal for hinges at exterior doors. Unless otherwise specified, furnish steel base metal for hinges at interior doors.
- H. Furnish stainless steel base metal for hinges at showers, pools, and wash bay doors.
- I. Unless otherwise specified, furnish hinges in the following sizes:
  1. 5" x 5"                      2-1/4" thick doors
  2. 4-1/2" x 4-1/2"        1-3/4" thick doors
  3. 3-1/2" x 3-1/2"        1-3/8" thick doors
- J. Furnish hinges with width to accommodate trim and allow for 180-degree swing.
- K. Unless otherwise specified, furnish hinges with flat button tips with non-rising pins at interior doors, non-removable loose pins (NRP) at exterior, and out-swinging lockable interior doors.
- L. Unless otherwise specified, furnish all hinges to template standards.

**2.3 LOCKS AND LATCHES**

- A. Acceptable manufacturers and respective catalog numbers:
 

	<u>Schlage</u>	<u>No Substitution</u>
1. Grade 1 Cylindrical	ND Series	
2. Small Case Mortise Deadbolt	L400 Series	
- A. Bored locks shall be independently certified by ANSI for compliance with ANSI A156.2 (2011). Interconnected locks shall be independently certified by ANSI for compliance with ANSI A156.12 (2013). Mortise locks shall be independently certified by ANSI for compliance with ANSI A156.13 (2012).
- B. Match existing lever trim.
- C. Unless otherwise specified, all locks and latches to have:
  1. 2-3/4" Backset
  2. 1/2" minimum throw latchbolt
  3. 1" throw deadbolt
  4. ANSI A115.2 strikes
- D. Provide guarded latch bolts for all locksets, and latch bolts with throw to maintain fire rating of both single and paired door assemblies.
- E. Provide strike with lip length adequate to clear surrounding trim.
- F. Provide wrought boxes for strikes at inactive doors, wood frames, and metal frames without integral mortar covers.
- G. Provide Von Duprin #154 or equivalent mullion/frame stabilizers at the following application(s) unless provided with deadbolt:

1. Lockable exterior or vestibule paired openings with a fixed or removable hollow metal or aluminum mullion.
2. Lockable exterior or vestibule single doors in aluminum frames.

## 2.4 PULLS, PUSH BARS, PUSH/PULL PLATES

A. Acceptable manufacturers and respective catalog numbers:

	<u>Ives</u>	<u>Burns</u>	<u>Hager</u>
1. Push Plate (.050 6"X 16")	8200 6" X 16"	56	30S 6 x 16
2. Pull Plate (1" dia., 10" CTC - .050" X 4" X 16")	8303-0 4" X 16"	5426C	34J 4 x 16

- A. Adjust dimensions of push plates to accommodate stile and rail dimensions, lite and louver cutouts, and adjacent hardware. Where required by adjacent hardware, push plates shall be factory drilled for cylinders or other mortised hardware. All push plates shall be beveled 4 sides and counter sunk.
- B. Where required on wide stile doors, install straight pull offset of cylinder to allow for access to cylinder.
- C. Where possible, provide back-to-back, and concealed mounting for pulls and push bars. Push bar length shall be 3" less door width, or center of stile to center of stile for stile & rail or full glass doors.

## 2.5 CLOSERS

A. Acceptable manufacturers and respective catalog numbers:

<u>LCN</u>	<u>No Substitution</u>
1. 4040XP / 4040XP EDA	

- B. Door closers shall be independently certified by ANSI for compliance with ANSI A156.4, Grade 1 (2013).
- C. Obtain door closers from a single manufacturer, although several may be indicated as offering products complying with requirements.
- D. Provide extra heavy-duty arm (EDA / HD) when closer is to be installed using parallel arm mounting.
- E. Hardware supplier shall coordinate with related trades to ensure aluminum frame profiles will accommodate specified door closers.
- F. Closers shall use high strength cast iron cylinders, forged main arms, and one-piece forged steel pistons.
- G. Closers shall utilize a stable fluid withstanding temperature range of +120deg F to -30deg F without seasonal adjustment of closer speed to properly close the door. Closers for fire-rated doors shall be provided with temperature stabilizing fluid that complies with standards UL10C.
- H. Unless otherwise specified, all door closers shall have full covers and separate adjusting valves for sweeps, latch, and backcheck.
- I. Provide closers for all labeled doors. Provide closer series and type consistent with other closers for similar doors specified elsewhere on the project.
- J. Provide closers with adjustable spring power. Size closers to ensure exterior and fire rated doors will consistently close and latch doors under existing conditions. Size all other door closers to allow for reduced opening force not to exceed 5 lbs.
- K. Install closers on the room side of corridor doors, stair side of stairways and interior side of exterior doors.
- L. Closers shall be furnished complete with all mounting brackets and cover plates as required by door and frame conditions, and by adjacent hardware.

- M. Door closers shall be provided with a powder coat finish to provide superior protection against the effects of weathering. Powder coat finish shall successfully pass a 100 hour salt spray test.
- N. Pressure Relief Valve, PRV, shall not be acceptable.

**2.6 KICK PLATES AND MOP PLATES**

- A. Furnish protective plates as specified in hardware groups.
- B. Where specified, provide 10" kick plates, 34" armor plates, and 4" mop plates. Unless otherwise specified, metal protective plates shall be .050" thick; plastic plates shall be 1/8" thick.
- C. Protective plates shall be 2" less door width, or 1" less door width at pairs. All protective plates shall be beveled 4 sides and counter sunk.
- D. Protection plates over 16" shall not be provided for labeled doors unless specifically approved by door manufacturers listing. When protection plates over 16" are provided for labeled doors, the plate shall be labeled.
- E. Where specified, provide surface mounted door edges. Edges shall butt to protective plates. Provide edges with cutouts as required adjacent hardware.
- F. Adjust dimensions of protection plates to accommodate stile and rail dimensions, lite and louver cutouts, and adjacent hardware. Where required by adjacent hardware, protection plates shall be factory drilled for cylinders or other mortised hardware.

**2.7 OVERHEAD STOPS**

- A. Acceptable manufacturers and respective catalog numbers:
 

	<u>Glynn-Johnson</u>	<u>Rixson</u>	<u>Sargent</u>
1. Heavy Duty Surface Mount	GJ900 Series	9 Series	590
2. Heavy Duty Concealed Mount	GJ100 Series	1 Series	690
- B. Unless otherwise specified, furnish GJ900 series overhead stop for hollow metal or 1-3/4" solid core doors equipped with regular arm surface type closers that swing more than 140 degrees before striking a wall, for hollow metal or 1-3/4" solid core doors that open against equipment, casework, sidelights, or other objects that would make wall bumpers inappropriate, and as specified in hardware groups.
- C. Furnish sex bolt attachments for wood and mineral core doors unless doors are supplied with proper reinforcing blocks.
- D. Provide special stop only ("SE" suffix) overhead stops when used in conjunction with electronic hold open closers.
- E. Do not provide holder function for labeled doors.

**2.8 WALL STOPS AND HOLDERS**

- A. Acceptable manufacturers and respective catalog numbers:
 

	<u>Ives</u>	<u>Hager</u>	<u>Burns</u>
1. Wrought Convex Wall Stop	WS406CVX	232W	570
2. Wrought Concave Wall Stop	WS406CCV	236W	575
- B. Furnish a stop or holder for all doors.
- C. Provide concave style wall stop at all adjacent integral push button locks; provide convex style wall stop at all other locations.
- D. Where wall stops are not applicable, furnish overhead stops.
- E. Furnish floor stops or hinge pin stops only where specified in hardware sets.
- F. Do not provide holder function for labeled doors.

**2.9 MANUALLY PROGRAMMED LOCKS**



- A. Acceptable manufacturers and respective catalog numbers:
  - 1. Cylindrical Lockset Schlage Electronics CO100-CY Series
- B. Provide locks with mechanical key override.
- C. Provide cylinders as required
- D. Lever trim shall match locksets when available.
- E. Bored locks shall be independently certified by ANSI for compliance with ANSI A156.2, Grade 1 (2011). Mortise locks shall be independently certified by ANSI for compliance with ANSI A156.13, Grade 1 (2012).
- F. Lockset shall be listed and certified for compliance with UL 294.
- G. Keypad operation to include the following:
  - 1. Momentary unlock time.
  - 2. Maintained unlock and re-lock.
  - 3. Freeze command.
  - 4. Pass Through command,
  - 5. 500 user codes.
  - 6. LED's for visual programming acknowledgement.
  - 7. Linked Access allowing multiple functions from a single credential when combined with multiple PIN codes.
- H. Hardware supplier shall be factory trained and certified by the manufacture to provide and support all computer managed locks and system components.
- I. Hardware supplier shall provide onsite training to the end user as required by the manufacturer.

**2.10 SLIDING DOOR HARDWARE (HOLLOW CORE) (SOLID CORE)**

- A. Acceptable Manufacturers and respective catalog numbers:
  - 1. Bi-Pass Kit K.N. Crowder As specified
- B. Provide complete hardware sets for each opening specified with sliding door hardware. Include track, ball-bearing hangers, door stops, fasteners, guides, and all hardware required for a complete installation.
- C. Hardware supplier shall coordinate with related trades to ensure that wall pocket framing will accommodate specified hardware.

**2.11 FINISHES AND BASE MATERIALS**

- A. Unless otherwise indicated in the hardware groups or herein, hardware finishes shall be applied over base metals as specified in the following finish schedule:

<u>HARDWARE ITEM</u>	<u>BHMA FINISH AND BASE MATERIAL</u>
1. Butt Hinges: Exterior, or Non-Ferrous	630 (US32D - Satin Stainless Steel)
2. Butt Hinges: Interior	652 (US26D - Satin Chromium)
3. Locks and Latches	626 (US26D - Satin Chromium)
4. Pulls and Push Plates/Bars	630 (US32D - Satin Stainless Steel)
5. Closers	689 (Powder Coat Aluminum)
6. Protective Plates	630 (US32D - Satin Stainless Steel)
7. Overhead Stops	630 (US32D - Satin Stainless Steel)
8. Wall Stops and Holders	630 (US32D - Satin Stainless Steel)
9. Miscellaneous	626 (US26D - Satin Chromium)

**2.12 KEYING**

- A. Provide all cylinders in keyways as required to accommodate owners existing Schlage key system.

- B. All locks under this section shall be keyed as directed by the owner to an existing Master Key System.
- C. Furnish a total of 2 keys per cylinder. Actual cut keys to be determined by owner.
- D. Master keys, control keys, and change keys shall be delivered by registered mail to the owner. Construction keys shall be delivered to the contractor.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Prior to installation of hardware, installer shall examine door frame installation to ensure frames have been set square and plumb. Installer shall examine doors, door frames, and adjacent wall, floor, and ceiling for conditions, which would adversely affect proper operation and function of door assemblies. Do not proceed with hardware installation until such deficiencies have been corrected.

#### **3.2 INSTALLATION**

- A. Before hardware installation, general contractor/construction manager shall coordinate a hardware installation seminar with a 1 week notice to all parties involved. The seminar is to be conducted on the installation of hardware, specifically of locksets, closers, exit devices, continuous hinges and overhead stops. Manufacturer's representative of the above products to present seminar. Seminar to be held at the job site and attended by installers of hardware (including low voltage hardware) for aluminum, hollow metal and wood doors. Training to include use of installation manuals, hardware schedule, templates and physical products samples.
- B. Shim doors as required to maintain proper operating clearance between door and frame.
- C. Install all hardware in accordance with the approved hardware schedule and manufacturer's instructions for installation and adjustment.
- D. Set units level, plumb and true to the line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- E. Provide blocking or reinforcement for all hardware mounted to drywall construction, including wall mounted door stops and holders.
- F. Drill and countersink units which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accord with industry standards.
- G. Drill appropriate size pilot holes for all hardware attached to wood doors and frames.
- H. Unless otherwise specified, locate all hardware in accordance with the recommended locations for builders hardware for standard doors and frames as published by the Door and Hardware Institute (TDH-007-20).
- I. Use only fasteners supplied by or approved by the manufacturer for each respective item of hardware.
- J. Mortise and cut to close tolerance and conceal evidence of cutting in the finished work.
- K. Conceal push and pull bar fasteners where possible. Do not install through bolts through push plates.
- L. Install hardware on UL labeled openings in accordance with manufacturer's requirements to maintain the label.
- M. Apply self-adhesive gasketing on frame stop at head & latch side and on rabbet of frame at hinge side.
- N. Install hardware in accordance with supplemental "S" label instructions on all fire rated openings.

- O. Install wall stops to contact lever handles or pulls. Do not mount wall stops on casework, or equipment.
- P. Where necessary, adjust doors and hardware as required to eliminate binding between strike and latchbolt. Doors should not rattle.
- Q. Overhead stops used in conjunction with electrified hold open closers shall be templated and installed to coincide with engagement of closer hold open position.
- R. Install door closers on corridor side of lobby doors, room side of corridor doors, and stair side of stairways.
- S. Adjust spring power of door closers to the minimum force required to ensure exterior and fire rated doors will consistently close and latch doors under existing conditions. Adjust all other door closers to ensure opening force does not to exceed 5 lbs.
- T. Adjust "sweep", "latch", & "back check" valves on all door closers to properly control door throughout the opening and closing cycle. Adjust total closing speed as required to comply with all applicable state and local building codes.
- U. Install "hardware compatible" (bar stock) type weatherstripping continuously for an uninterrupted seal. Adjust templating for parallel arm door closers, exit devices, etc., as required to accommodate weatherstripping.
- V. Unless otherwise specified or detailed, install thresholds with the bevel in vertical alignment with the outside door face. Notch and closely fit thresholds to frame profile. Set thresholds in full bed of sealant.
- W. Compress sweep during installation as recommended by sweep manufacturer to facilitate a water-resistant seal.
- X. Deliver to the owner 1 complete set of installation and adjustment instructions, and tools as furnished with the hardware.

### **3.3 FIELD QUALITY CONTROL**

- A. After installation has been completed, the hardware supplier and manufacturers representative for locksets, door closers, exit devices, and overhead stops shall check the project and verify compliance with installation instructions, adjustment of all hardware items, and proper application according to the approved hardware schedule. Hardware representative shall submit a list of all hardware that has not been installed correctly.
- B. After installation has been completed, the hardware supplier and manufacturers representative shall meet with the owner to explain the functions, uses, adjustment, and maintenance of each item of hardware. Hardware supplier shall provide the owner with a copy of all wiring diagrams. Wiring diagrams shall be opening specific and include both a riser diagram and point to point diagram showing all wiring terminations.

### **3.4 ADJUSTMENT AND CLEANING**

- A. At final completion, and when H.V.A.C. equipment is in operation, installer shall make final adjustments to and verify proper operation of all door closers and other items of hardware. Lubricate moving parts with type lubrication recommended by the manufacturer.
- B. All hardware shall be left clean and in good operation. Hardware found to be disfigured, defective, or inoperative shall be repaired or replaced.

### **3.5 HARDWARE SCHEDULE**

- A. The following schedule of hardware groups are intended to describe opening function. The hardware supplier is cautioned to refer to the preamble of this specification for a complete description of all materials and services to be furnished under this section.

**HW SET 01**

	EA	HINGES	(AS SPECIFIED)	IVE
1	EA	ELEC CLASSROOM LOCK	CO-100-CY-70-KP	SCE
1	EA	SURFACE CLOSER	4040XP / 4040XP EDA	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	IVE
1	EA	WALL STOP	WS406/407CVX	IVE
1	EA	SMOKE SEALS	188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY)	ZER

FUNCTION: CO-100-70 CLASSROOM/STOREROOM LOCKSET IS NORMALLY SECURE. INSIDE LEVER ALWAYS ALLOWS FREE EGRESS. VALID TOGGLE CREDENTIALS ON THE EXTERIOR MAY BE USED TO CHANGE TO A PASSAGE OR SECURED STATUS.

**HW SET 02**

	EA	HINGES	(AS SPECIFIED)	IVE
1	EA	DBL CYL DEAD LOCK	L462	SCH
1	EA	PUSH PLATE	8200 6" X 16"	IVE
1	EA	PULL PLATE	8303 10" 4" X 16"	IVE
1	EA	SURFACE CLOSER	4040XP / 4040XP EDA	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	IVE
1	EA	WALL STOP	WS406/407CVX	IVE

FUNCTION: L462 E06061 DOUBLE CYLINDER LOCK\* DEADBOLT OPERATED BY KEY FROM EITHER SIDE.

**HW SET 03**

1	EA	BARN DOOR KIT	CFT-201-CC	KNC
1	EA	DOOR PULL, 3/4" RND	PR 8102 - 6"	IVE

**HW SET 04**

	EA	HINGES	(AS SPECIFIED)	IVE
1	EA	CLASSROOM LOCK	ND70	SCH
1	EA	SURFACE CLOSER	4040XP / 4040XP EDA	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	IVE
1	EA	WALL STOP & HOLDER	WS40	IVE
1	EA	SMOKE SEALS	188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY)	ZER

FUNCTION: ND70 (F84) CLASSROOM LOCK OUTSIDE LEVER LOCKED AND UNLOCKED BY KEY. INSIDE LEVER ALWAYS UNLOCKED.

**HW SET 05**

	EA	HINGES	(AS SPECIFIED)	IVE
1	EA	CONST LATCHING BOLT	FB51T / FB61T (TOP BOLT)	IVE
1	EA	CLASSROOM LOCK	ND70	SCH
2	EA	WALL STOP & HOLDER	WS40	GLY
1	EA	SMOKE SEALS	188S (AT RATED OR SMOKE & DRAFT CONTROL DRS ONLY)	ZER

FUNCTION: ND70 (F84) CLASSROOM LOCK  
OUTSIDE LEVER LOCKED AND UNLOCKED BY KEY. INSIDE LEVER ALWAYS UNLOCKED.

**SECTION 090561  
COMMON WORK RESULTS FOR FLOORING PREPARATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. This section applies to floors identified in Contract Documents that are receiving the following types of floor coverings:
  - 1. Carpet tile.
  - 2. Thin-set ceramic tile.
- B. Removal of existing floor coverings.
- C. Preparation of new and existing concrete floor slabs for installation of floor coverings.
- D. Testing of concrete floor slabs for moisture and alkalinity (pH).
- E. Patching compound.
- F. Remedial floor coatings.

**1.02 REFERENCE STANDARDS**

- A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 50 mm [2 in.] Cube Specimens); 2023.
- B. ASTM C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters, and Gypsum Concrete; 2020.
- C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2022.
- D. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2023.
- E. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; 2018.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate scheduling of cleaning and testing, so that preliminary cleaning has been completed for at least 24 hours prior to testing.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Visual Observation Report: For existing floor coverings to be removed.
- C. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
  - 1. Moisture and alkalinity (pH) limits and test methods.
  - 2. Manufacturer's required bond/compatibility test procedure.
- D. Adhesive Bond and Compatibility Test Report.

**1.05 QUALITY ASSURANCE**

- A. Contractor may perform adhesive and bond test with Contractor's own personnel or hire a testing agency.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, store, handle, and protect products in accordance with manufacturer's instructions and recommendations.
- B. Deliver materials in manufacturer's packaging; include installation instructions.
- C. Keep materials from freezing.

**1.07 FIELD CONDITIONS**

- A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at

least 48 hours prior to testing, at not less than 65 degrees F or more than 85 degrees F.

- B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:
  - 1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.
  - 2. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M or ASTM C472, whichever is appropriate.
  - 3. Products:
    - a. ARDEX Engineered Cements: [www.ardexamericas.com/#sle](http://www.ardexamericas.com/#sle).
    - b. Floor Seal Technology, Inc: [www.floorseal.com/#sle](http://www.floorseal.com/#sle).
    - c. H.B. Fuller Construction Products, Inc: [www.tecspecialty.com/#sle](http://www.tecspecialty.com/#sle).
    - d. LATICRETE International, Inc: [www.laticrete.com/#sle](http://www.laticrete.com/#sle).
    - e. USG Corporation: [www.usg.com/#sle](http://www.usg.com/#sle).
    - f. Substitutions: See Section 016000 - Product Requirements.
- B. Alternate Flooring Adhesive: Floor covering manufacturer's recommended product, suitable for the moisture and pH conditions present; low-VOC. In the absence of any recommendation from flooring manufacturer, provide a product recommended by adhesive manufacturer as suitable for substrate and floor covering and for conditions present.
- C. Remedial Floor Coating: Single- or multi-layer coating or coating/overlay combination intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.
  - 1. Thickness: As required for application and in accordance with manufacturer's installation instructions.
  - 2. Products:
    - a. Allied Construction Technologies, Inc; \_\_\_\_\_: [www.actechperforms.com/#sle](http://www.actechperforms.com/#sle).
    - b. ARDEX Engineered Cements; ARDEX VB 100: [www.ardexamericas.com/#sle](http://www.ardexamericas.com/#sle).
    - c. Custom Building Products: [www.custombuildingproducts.com/#sle](http://www.custombuildingproducts.com/#sle).
    - d. Floor Seal Technology, Inc: [www.floorseal.com/#sle](http://www.floorseal.com/#sle).
    - e. LATICRETE International, Inc: [www.laticrete.com/#sle](http://www.laticrete.com/#sle).
    - f. Maxxon Corporation; Maxxon MVP One Primer: [www.maxxon.com/#sle](http://www.maxxon.com/#sle).
    - g. USG Corporation: [www.usg.com/#sle](http://www.usg.com/#sle).
    - h. Substitutions: See Section 016000 - Product Requirements.

## **PART 3 EXECUTION**

### **3.01 CONCRETE SLAB PREPARATION**

- A. Perform following operations in the order indicated:
  - 1. Existing concrete slabs (on-grade and elevated) with existing floor coverings:
    - a. Visual observation of existing floor covering, for adhesion, water damage, alkaline deposits, and other defects.
    - b. Removal of existing floor covering.
  - 2. Preliminary cleaning.
  - 3. Moisture vapor emission tests; 3 tests in the first 1000 square feet and one test in each additional 1000 square feet, unless otherwise indicated or required by flooring manufacturer.

4. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
  5. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
  6. Specified remediation, if required.
  7. Patching, smoothing, and leveling, as required.
  8. Other preparation specified.
  9. Adhesive bond and compatibility test.
  10. Protection.
- B. Remediations:
1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct this condition before doing any other remediation; re-test after correction.
  2. Excessive Moisture Emission or Relative Humidity: If an adhesive that is resistant to the level of moisture present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply remedial floor coating over entire suspect floor area.
  3. Excessive Alkalinity (pH): If remedial floor coating is necessary to address excessive moisture, no additional remediation is required; if not, if an adhesive that is resistant to the level present is available and acceptable to the flooring manufacturer, use that adhesive for installation of the flooring; otherwise, apply a skim coat of specified patching compound over entire suspect floor area.

### **3.02 REMOVAL OF EXISTING FLOOR COVERINGS**

- A. Comply with local, State, and federal regulations and recommendations of RFCI (RWP), as applicable to floor covering being removed.
- B. Dispose of removed materials in accordance with local, State, and federal regulations and as specified.

### **3.03 PRELIMINARY CLEANING**

- A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.
- B. Do not use solvents or other chemicals for cleaning.

### **3.04 MOISTURE VAPOR EMISSION TESTING**

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F1869 and as follows.
- D. Plastic sheet test and mat bond test may not be substituted for the specified ASTM test method, as those methods do not quantify the moisture content sufficiently.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet per 24 hours.
- F. Report: Report the information required by the test method.

### **3.05 ALKALINITY TESTING**

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. The following procedure is the equivalent of that described in ASTM F710, repeated here for the Contractor's convenience.
  1. Use a wide range alkalinity (pH) test paper, its associated chart, and distilled or deionized



- water.
2. Place several drops of water on a clean surface of concrete, forming a puddle approximately 1 inch in diameter. Allow the puddle to set for approximately 60 seconds, then dip the alkalinity (pH) test paper into the water, remove it, and compare immediately to chart to determine alkalinity (pH) reading.
  3. Use of a digital pH meter with probe is acceptable; follow meter manufacturer's instructions.
- C. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

### **3.06 PREPARATION**

- A. See individual floor covering section(s) for additional requirements.
- B. Comply with requirements and recommendations of floor covering manufacturer.
- C. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.
- D. Do not fill expansion joints, isolation joints, or other moving joints.

### **3.07 ADHESIVE BOND AND COMPATIBILITY TESTING**

- A. Comply with requirements and recommendations of floor covering manufacturer.

### **3.08 APPLICATION OF REMEDIAL FLOOR COATING**

- A. Comply with requirements and recommendations of coating manufacturer.

### **3.09 APPLICATION OF REMEDIAL FLOOR TREATMENT**

- A. Comply with requirements and recommendations of treatment manufacturer.

### **3.10 PROTECTION**

- A. Cover prepared floors with building paper or other durable covering.

**END OF SECTION**

**SECTION 092116  
GYPSUM BOARD ASSEMBLIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Performance criteria for gypsum board assemblies.
- B. Metal stud wall framing.
- C. Metal channel ceiling framing.
- D. Acoustic insulation.
- E. Cementitious backing board.
- F. Gypsum wallboard.
- G. Joint treatment and accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 061000 - Rough Carpentry: Wood blocking product and execution requirements.

**1.03 REFERENCE STANDARDS**

- A. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2023.
- B. AISI SG02-1 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2001 with 2004 supplement. (replaced SG-971)
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- D. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2017 (Reapproved 2022).
- E. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2018.
- F. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2023.
- G. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2020.
- H. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2023.
- I. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2019.
- J. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.
- K. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2023.
- L. ASTM E413 - Classification for Rating Sound Insulation; 2022.
- M. GA-216 - Application and Finishing of Gypsum Panel Products; 2024.
- N. GA-226 - Application of Gypsum Board to Form Curved Surfaces; 2019.
- O. GA-600 - Fire Resistance and Sound Control Design Manual; 2024.
- P. UL (FRD) - Fire Resistance Directory; Current Edition.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.
- C. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.

## **PART 2 PRODUCTS**

### **2.01 GYPSUM BOARD ASSEMBLIES**

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
- B. Interior Partitions, Indicated as Acoustic: Provide completed assemblies with the following characteristics:
  - 1. Acoustic Attenuation: STC of 45-49 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- C. Shaft Walls at HVAC Shafts: Provide completed assemblies with the following characteristics:
  - 1. Air Pressure Within Shaft: Sustained loads of 5 lbf/sq ft with maximum mid-span deflection of L/240.
  - 2. Acoustic Attenuation: STC of 35-39 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- D. Fire-Resistance-Rated Assemblies: Provide completed assemblies with the following characteristics:
  - 1. Fire Rated Partitions, Ceilings, and Soffits : See Drawings.
  - 2. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).

### **2.02 METAL FRAMING MATERIALS**

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
  - 1. ClarkDietrich Building Systems: [www.clarkdietrich.com/#sle](http://www.clarkdietrich.com/#sle).
  - 2. Jaimes Industries: [www.jaimesind.com/#sle](http://www.jaimesind.com/#sle).
  - 3. Marino: [www.marinoware.com/#sle](http://www.marinoware.com/#sle).
  - 4. Steel Construction Systems: [www.steelconsystems.com/#sle](http://www.steelconsystems.com/#sle).
  - 5. Phillips Manufacturing Company: [www.phillipsmfg.com](http://www.phillipsmfg.com).
  - 6. Substitutions: See Section 016000 - Product Requirements.
- B. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.
  - 1. Studs: "C" shaped with flat or formed webs with knurled faces.
  - 2. Runners: U shaped, sized to match studs.
  - 3. Ceiling Channels: C-shaped.
  - 4. Furring: Hat-shaped sections, minimum depth of 7/8 inch.
  - 5. Resilient Furring Channels: Single or double leg configuration; 1/2 inch channel depth.
    - a. Products:
      - 1) ClarkDietrich; RC Deluxe Resilient Channel: [www.clarkdietrich.com/#sle](http://www.clarkdietrich.com/#sle).
      - 2) Phillips Manufacturing Co; RC-2 Resilient Sound Channel: [www.phillipsmfg.com/#sle](http://www.phillipsmfg.com/#sle).
      - 3) Substitutions: See Section 016000 - Product Requirements.
- C. Shaft Wall Studs and Accessories: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 and specified performance requirements.
  - 1. Products:
    - a. Same manufacturer as other framing materials.
    - b. Substitutions: See Section 016000 - Product Requirements.
- D. Area Separation Wall Studs and Accessories: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with specified performance requirements.
  - 1. Products:
    - a. Phillips Manufacturing Co; Hemmed H-Stud: [www.phillipsmfg.com/#sle](http://www.phillipsmfg.com/#sle).
    - b. Substitutions: See Section 016000 - Product Requirements.
- E. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.

- F. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
  - 1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI S100-12.
  - 2. Material: ASTM A653/A653M steel sheet, SS Grade 50/340, with G60/Z180 hot dipped galvanized coating.
  - 3. Deflection and Firestop Track:
    - a. Provide mechanical anchorage devices as described above that accommodate deflection while maintaining the fire-rating of the wall assembly.
- G. Non-structural Framing Accessories:
  - 1. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
  - 2. Framing Connectors: ASTM A653/A653M G90 galvanized steel clips; secures cold rolled channel to wall studs for lateral bracing.

### 2.03 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
  - 1. American Gypsum Company: [www.americangypsum.com/#sle](http://www.americangypsum.com/#sle).
  - 2. CertainTeed Corporation: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
  - 3. Georgia-Pacific Gypsum: [www.gpgypsum.com/#sle](http://www.gpgypsum.com/#sle).
  - 4. National Gypsum Company: [www.nationalgypsum.com/#sle](http://www.nationalgypsum.com/#sle).
  - 5. USG Corporation: [www.usg.com/#sle](http://www.usg.com/#sle).
  - 6. Substitutions: See Section 016000 - Product Requirements.
- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
  - 1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
  - 2. Thickness:
    - a. Vertical Surfaces: 5/8 inch.
    - b. Ceilings: 5/8 inch.
  - 3. Paper-Faced Products:
    - a. American Gypsum Company; LightRoc Gypsum Wallboard.
    - b. CertainTeed Corporation; Type C Drywall.
    - c. Georgia-Pacific Gypsum; ToughRock.
    - d. National Gypsum Company; Gold Bond BRAND Fire-Shield Gypsum Board.
  - 4. Mold Resistant Paper Faced Products:
    - a. American Gypsum Company; M-Bloc.
    - b. CertainTeed Corporation; M2Tech 5/8" Type C Moisture & Mold Resistant Drywall.
    - c. Georgia-Pacific Gypsum; ToughRock Mold-Guard.
    - d. National Gypsum Company; Gold Bond XP Gypsum Board.
    - e. Substitutions: See Section 016000 - Product Requirements.
  - 5. Glass Mat Faced Products:
    - a. Continental Building Products; Weather Defense Platinum Interior.
    - b. Georgia-Pacific Gypsum; DensArmor Plus.
    - c. National Gypsum Company; Gold Bond eXP Interior Extreme Gypsum Panel.
    - d. USG Corporation; USG Sheetrock Brand Glass-Mat Panels Mold Tough.
    - e. Substitutions: See Section 016000 - Product Requirements.
- C. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
  - 1. Application: Ceilings, unless otherwise indicated.
  - 2. Thickness: 5/8 inch.
  - 3. Edges: Tapered.
  - 4. Products:

- a. American Gypsum; Interior Ceiling Board.
  - b. CertainTeed Corporation; ProRoc Interior Ceiling.
  - c. Georgia-Pacific Gypsum; ToughRock Span 24 Ceiling Board.
  - d. Lafarge North America Inc; Sagcheck.
  - e. National Gypsum Company; High Strength Brand Ceiling Board.
  - f. Pacific Coast Building Products, Inc; PABCO Ceiling Board.
  - g. USG Corporation; Sheetrock Brand Sag-Resistant Interior Gypsum Ceiling Board.
  - h. Substitutions: See Section 016000 - Product Requirements.
- D. Ceiling Board For Wet Areas: Mold and moisture resistant gypsum ceiling board with fiberglass mats as defined in ; sizes to minimize joints in place; ends square cut.
- 1. Application: Ceilings in wet areas, unless otherwise indicated.
  - 2. Thickness: 5/8 inch.
  - 3. Edges: Tapered.
  - 4. Products:
    - a. Basis of Design: Georgia-Pacific Gypsum; DensArmor Plus.
    - b. Substitutions: See Section 016000 - Product Requirements.

## **2.04 GYPSUM WALLBOARD ACCESSORIES**

- A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced. Thickness: 6 inch.
- B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.
- 1. Products:
    - a. Franklin International, Inc; Titebond GREENchoice Professional Acoustical Smoke and Sound Sealant: [www.titebond.com/#sle](http://www.titebond.com/#sle).
    - b. Liquid Nails, a brand of PPG Architectural Coatings; AS-825 Acoustical Sound Sealant: [www.liquidnails.com/#sle](http://www.liquidnails.com/#sle).
    - c. Specified Technologies Inc; Smoke N Sound Acoustical Sealant: [www.stifirestop.com/#sle](http://www.stifirestop.com/#sle).
    - d. Substitutions: See Section 016000 - Product Requirements.
- C. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, galvanized steel, or rolled zinc, unless noted otherwise.
- D. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
- 1. Fiberglass Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
  - 2. Paper Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
  - 3. Ready-mixed vinyl-based joint compound.
  - 4. Chemical hardening type compound.
  - 5. Joint Compound: Setting type, field-mixed.
- E. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.
- F. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion resistant.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that project conditions are appropriate for work of this section to commence.

### **3.02 FRAMING INSTALLATION**

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Suspended Ceilings and Soffits: Space framing and furring members at 16 inches on center.
  - 1. Laterally brace entire suspension system.
  - 2. Install bracing as required at exterior locations to resist wind uplift.
- C. Studs: Space studs at 16 inches on center.
  - 1. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging.
  - 2. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.
- D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
- E. Standard Wall Furring: Install at concrete walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
- F. Furring for Fire-Resistance Ratings: Install as required for fire-resistance ratings indicated and to GA-600 requirements.
- G. Blocking: Install wood blocking for support of:
  - 1. Framed openings.
  - 2. Wall mounted cabinets.
  - 3. Plumbing fixtures.
  - 4. Toilet partitions.
  - 5. Toilet accessories.
  - 6. Wall mounted door hardware.

### **3.03 ACOUSTIC ACCESSORIES INSTALLATION**

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
  - 1. Place one bead continuously on substrate before installation of perimeter framing members.
  - 2. Place continuous bead at perimeter of each layer of gypsum board.
  - 3. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

### **3.04 BOARD INSTALLATION**

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Nonrated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
- C. Double-Layer, Nonrated: Use gypsum board for first layer, placed parallel to framing or furring members, with ends and edges occurring over firm bearing. Use glass mat faced gypsum board at exterior walls and at other locations as indicated. Place second layer perpendicular to framing or furring members. Offset joints of second layer from joints of first layer.
- D. Fire-Resistance-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- E. Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.

1. Seal joints, cut edges, and holes with water-resistant sealant.
- F. Exterior Soffits: Install exterior soffit board perpendicular to framing, with staggered end joints over framing members or other solid backing.
  1. Seal joints, cut edges, and holes with water-resistant sealant.
- G. Cementitious Backing Board: Install over steel framing members and plywood substrate where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.
- H. Installation on Metal Framing: Use screws for attachment of gypsum board except face layer of nonrated double-layer assemblies, which may be installed by means of adhesive lamination.
- I. Curved Surfaces: Apply gypsum board to curved substrates in accordance with GA-226.

### **3.05 INSTALLATION OF TRIM AND ACCESSORIES**

- A. Control Joints: Place control joints consistent with lines of building spaces and as follows:
  1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
  2. At exterior soffits, not more than 30 feet apart in both directions.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

### **3.06 JOINT TREATMENT**

- A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, embed and finish with setting type joint compound.
- B. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.
- C. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
  1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
  2. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.
- D. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
  1. Feather coats of joint compound so that camber is maximum 1/32 inch.
- E. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.
- F. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

### **3.07 TOLERANCES**

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

**END OF SECTION**

**SECTION 093000  
TILING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Tile for floor applications.
- B. Tile for wall applications.
- C. Ceramic accessories.
- D. Non-ceramic trim.

**1.02 RELATED REQUIREMENTS**

- A. Section 079005 - Joint Sealers: Sealing joints between tile work and adjacent construction and fixtures.
- B. Section 092116 - Gypsum Board Assemblies: Tile backer board.

**1.03 REFERENCE STANDARDS**

- A. ANSI A108/A118/A136.1 - Specifications for the Installation of Ceramic Tile; 2020.
- B. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive; 2021.
- C. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2023.
- D. ANSI A118.6 - American National Standard Specifications for Standard Cement Grouts for Tile Installation; 2019.
- E. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2014 (Reaffirmed 2019).
- F. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2022.
- G. ASTM C373 - Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products; 2018 (Reapproved 2023).
- H. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2024.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.
- C. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.
- D. Samples: Mount tile and apply grout on two plywood panels, minimum 18 by 18 inches in size illustrating pattern, color variations, and grout joint size variations.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Installer's Qualification Statement:
- G. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 016000 - Product Requirements, for additional provisions.
  - 2. Extra Tile: 5 percent of each size, color, and surface finish combination.



### **1.05 QUALITY ASSURANCE**

- A. Maintain one copy of and ANSI A108/A118/A136.1 and TCNA (HB) on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.
- C. Installer Qualifications:
  - 1. Company specializing in performing tile installation, with minimum of five years of documented experience.
- D. Installer Qualifications: Company specializing in performing tile installation, with minimum of five years of documented experience.

### **1.06 MOCK-UP**

- A. See Section 014000 - Quality Requirements, for general requirements for mock-up.
- B. Construct tile mock-up where indicated on drawings, incorporating all components specified for the location.
  - 1. Approved mock-up may remain as part of the Work.

### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

### **1.08 FIELD CONDITIONS**

- A. Do not install solvent-based products in an unventilated environment.
- B. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

## **PART 2 PRODUCTS**

### **2.01 TILE**

- A. Manufacturers:
  - 1. Kate-Lo Tile.
  - 2. Substitutions: See Section 016000 - Product Requirements.
- B. Porcelain Floor & Wall Tile, Type PT-1 & PT-3: ANSI A137.1, standard grade.
  - 1. Moisture Absorption: 0.5 to 3.0 percent as tested in accordance with ASTM C373.
  - 2. Size: See Finished Legend
  - 3. Color(s): As indicated on drawings.
  - 4. Pattern: See Finish Legend.
  - 5. Trim Units: Matching bead, cove, and surface bullnose shapes in sizes coordinated with field tile.
  - 6. Products:
    - a. Kate-Lo Tile; Craft.
- C. Porcelain Floor Tile, Type PT-2: ANSI A137.1, standard grade.
  - 1. Moisture Absorption: 0.5 to 3.0 percent as tested in accordance with ASTM C373.
  - 2. Size: 2" x 2" mosaic, nominal.
  - 3. Color(s): As indicated on drawings.
  - 4. Trim Units: Matching bead, bullnose, cove, and base shapes in sizes coordinated with field tile.
  - 5. Products:
    - a. Kate-Lo Tile; Craft.
    - b. Substitutions: See Section 016000 - Product Requirements.

### **2.02 TRIM AND ACCESSORIES**

- A. Ceramic Accessories: Unglazed finish, same color and finish as adjacent field tile; same manufacturer as tile.
- B. Non-Ceramic Trim: See Finish Schedule for finish, style and dimensions to suit application, for

setting using tile mortar or adhesive.

1. Applications:
  - a. Open edges of wall tile.
  - b. Open edges of floor tile.
  - c. Wall corners, outside and inside.
  - d. Transition between floor finishes of different heights.
  - e. Thresholds at door openings.
  - f. Expansion and control joints, floor and wall as indicated on Drawings.
  - g. Floor to wall joints.
  - h. Borders and other trim as indicated on drawings.
2. Manufacturers:
  - a. Schluter-Systems: [www.schluter.com/#sle](http://www.schluter.com/#sle).
  - b. Genesis APS International: [www.genesis-aps.com/#sle](http://www.genesis-aps.com/#sle).
  - c. Substitutions: See Section 016000 - Product Requirements.

### 2.03 SETTING MATERIALS

- A. Provide setting and grout materials from same manufacturer.
- B. Manufacturers:
  1. ARDEX Engineered Cements: [www.ardexamericas.com/#sle](http://www.ardexamericas.com/#sle).
  2. Bostik Inc: [www.bostik-us.com/#sle](http://www.bostik-us.com/#sle).
  3. Custom Building Products: [www.custombuildingproducts.com/#sle](http://www.custombuildingproducts.com/#sle).
  4. LATICRETE International, Inc: [www.laticrete.com/#sle](http://www.laticrete.com/#sle).
  5. Merkrete, by Parex USA, Inc: [www.merkrete.com/sle](http://www.merkrete.com/sle).
  6. ProSpec, an Oldcastle brand: [www.prospec.com](http://www.prospec.com).
- C. Provide setting materials made by the same manufacturer as grout.
- D. Latex-Portland Cement Mortar Bond Coat: {rs#1}, {rs#1}.
  1. Products:
    - a. ARDEX Engineered Cements; ARDEX X 77 MICROTEC: [www.ardexamericas.com](http://www.ardexamericas.com).
    - b. AVM Industries, Inc; Thin-Set 780: [www.avmindustries.com](http://www.avmindustries.com).
    - c. LATICRETE International, Inc; LATICRETE 254 Platinum: [www.laticrete.com](http://www.laticrete.com).
    - d. Substitutions: See Section 016000 - Product Requirements.

### 2.04 GROUTS

- A. Manufacturers:
  1. ARDEX Engineered Cements: [www.ardexamericas.com/#sle](http://www.ardexamericas.com/#sle).
  2. LATICRETE International, Inc; LATICRETE PERMACOLOR Grout: [www.laticrete.com/#sle](http://www.laticrete.com/#sle).
  3. Basis of Design: Mapei.
  4. Substitutions: See Section 016000 - Product Requirements.
- B. Standard Grout: ANSI A118.6 standard cement grout.
  1. Applications: Use this type of grout where indicated and where no other type of grout is indicated.
  2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
  3. Color(s): As indicated on drawings.
  4. Products:
    - a. LATICRETE International, Inc; LATICRETE 1500 Sanded Grout: [www.laticrete.com/#sle](http://www.laticrete.com/#sle).
- C. Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout.
  1. Color(s): As indicated on drawings.
  2. Products:
    - a. LATICRETE International, Inc; LATICRETE SPECTRALOCK PRO Premium Grout:

[www.laticrete.com/#sle](http://www.laticrete.com/#sle).

- b. Substitutions: See Section 016000 - Product Requirements.
- D. Grout Sealer: Liquid-applied, moisture and stain protection for existing or new Portland cement grout.
  - 1. Composition: Water-based colorless silicone.

## **2.05 ACCESSORY MATERIALS**

- A. Concrete Floor Slab Crack Isolation Membrane: Material complying with ANSI A118.12; not intended as waterproofing.
  - 1. Thickness: 20 mils, maximum.
  - 2. Crack Resistance: No failure at 1/16 inch gap, minimum.
  - 3. Products:
    - a. LATICRETE International, Inc; LATICRETE Blue 92 Anti-Fracture Membrane:  
[www.laticrete.com/#sle](http://www.laticrete.com/#sle).
    - b. Substitutions: See Section 016000 - Product Requirements.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.
- C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.
- D. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.
- E. Verify that required floor-mounted utilities are in correct location.

### **3.02 PREPARATION**

- A. Protect surrounding work from damage.
- B. Vacuum clean surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

### **3.03 INSTALLATION - GENERAL**

- A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.13, manufacturer's instructions, and TCNA (HB) recommendations.
- B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
- D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.
- E. Form internal angles square and external angles bullnosed.
- F. Install ceramic accessories rigidly in prepared openings.
- G. Install non-ceramic trim in accordance with manufacturer's instructions.
- H. Sound tile after setting. Replace hollow sounding units.
- I. Keep control and expansion joints free of mortar, grout, and adhesive.
- J. Keep expansion joints free of adhesive or grout. Apply sealant to joints.

- K. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
- L. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.
- M. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.
- N. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

#### **3.04 INSTALLATION - FLOORS - THIN-SET METHODS**

- A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.
  - 1. Use uncoupling membrane under all tile unless other underlayment is indicated.
  - 2. Where waterproofing membrane is indicated, install in accordance with TCNA (HB) Method F122, with latex-Portland cement grout.

#### **3.05 INSTALLATION - WALL TILE**

- A. Over coated glass mat backer board on studs, install in accordance with TCNA (HB) Method W245.

#### **3.06 CLEANING**

- A. Clean tile and grout surfaces.

#### **3.07 PROTECTION**

- A. Do not permit traffic over finished floor surface for 4 days after installation.

**END OF SECTION**

**SECTION 096813  
TILE CARPETING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Carpet tile, loose laid with edges and control grid adhered.
- B. Resilient base.

**1.02 REFERENCE STANDARDS**

- A. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2016 (Reapproved 2021).
- B. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2023.
- C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2022.
- D. ASTM F1861 - Standard Specification for Resilient Wall Base; 2021.
- E. CRI (CIS) - Carpet Installation Standard; Carpet and Rug Institute; 2011.
- F. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2023.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.
- D. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 016000 - Product Requirements, for additional provisions.
  - 2. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

**1.05 FIELD CONDITIONS**

- A. Store materials in area of installation for minimum period of 24 hours prior to installation.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Tile Carpeting: Basis of Design: Mannington
  - 1. J&J Flooring Group
  - 2. Substitutions: See Section 016000 - Product Requirements.

**2.02 MATERIALS**

- A. Carpet Tile Type CPT-1: Textured Pattern Loop, manufactured in one color dye lot.
  - 1. Product: Storyline manufactured by J+J Flooring .
  - 2. Tile Size: 12 X 48 inch, nominal.

3. Color: Drama.
4. Gage: 1/12 inch.
5. Pattern: 7589-3005.
6. Weight: 19 oz/sq yd
7. Installation Method: Herringbone- see finish plan

### **2.03 ACCESSORIES**

- A. Sub-Floor Filler: White premix latex; type recommended by flooring material manufacturer.
- B. Resilient Base - Type VB-1: ASTM F1861, Type TV, vinyl, thermoplastic; style as scheduled.
  1. Manufacturers: Basis of Design: VPI
    - a. Flexco Corporation: [www.flexcofloors.com/#sle](http://www.flexcofloors.com/#sle).
    - b. Johnsonite, a Tarkett Company: [www.johnsonite.com/#sle](http://www.johnsonite.com/#sle).
    - c. Mannington Commercial: [www.manningtoncommercial.com/#sle](http://www.manningtoncommercial.com/#sle).
    - d. Roppe Corporation: [www.roppe.com/#sle](http://www.roppe.com/#sle).
    - e. Substitutions: See Section 016000 - Product Requirements.
  2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
  3. Height: 4 inches.
  4. Thickness: 0.125 inch.
  5. Length: Roll.
  6. Color: As indicated on drawings.
- C. Edge Strips: Vinyl, color as selected by Architect.
- D. Adhesives: Acceptable to carpet tile manufacturer, compatible with materials being adhered; maximum VOC of 50 g/L; CRI Green Label certified; in lieu of labeled product, independent test report showing compliance is acceptable.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive carpet tile.
- C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.
- D. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for flooring installation by testing for moisture and pH.

### **3.02 PREPARATION**

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.
- C. Vacuum clean substrate.

### **3.03 INSTALLATION**

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.
- F. Trim carpet tile neatly at walls and around interruptions.

G. Complete installation of edge strips, concealing exposed edges.

**3.04 CLEANING**

A. Remove excess adhesive without damage, from floor, base, and wall surfaces.

B. Clean and vacuum carpet surfaces.

**END OF SECTION**

**SECTION 099000  
PAINTING AND COATING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
  - 1. Exposed surfaces of steel lintels and ledge angles.
  - 2. Mechanical and Electrical:
    - a. In finished areas, paint all insulated and exposed pipes, unless otherwise indicated.
- D. Do Not Paint or Finish the Following Items:
  - 1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
  - 2. Items indicated to receive other finishes.
  - 3. Items indicated to remain unfinished.
  - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
  - 5. Floors, unless specifically so indicated.
  - 6. Glass.
  - 7. Concealed pipes, ducts, and conduits.

**1.02 RELATED REQUIREMENTS**

- A. Section 055000 - Metal Fabrications: Shop-primed items.

**1.03 REFERENCE STANDARDS**

- A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2024.
- B. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2020.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of all products to be used, with the following information for each:
  - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
  - 2. MPI product number (e.g. MPI #47).
  - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
  - 1. Where sheen is specified, submit samples in only that sheen.
- D. Samples: Submit two painted samples, illustrating selected colors and textures for each color and system selected with specified coats cascaded. Submit on aluminum sheet, 4 x 8 inch in size.
- E. Manufacturer's Instructions: Indicate special surface preparation procedures.
- F. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.



## **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

## **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

## **1.07 FIELD CONDITIONS**

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Provide all paint and coating products used in any individual system from the same manufacturer; no exceptions.
- B. Paints:
  - 1. Diamond Vogel Paints: [www.diamondvogel.com/#sle](http://www.diamondvogel.com/#sle).
  - 2. Duron, Inc: [www.duron.com/#sle](http://www.duron.com/#sle).
  - 3. Glidden Professional, a product of PPG Architectural Coatings: [www.gliddenprofessional.com](http://www.gliddenprofessional.com).
  - 4. Benjamin Moore & Co: [www.benjaminmoore.com/#sle](http://www.benjaminmoore.com/#sle).
  - 5. PPG Paints: [www.ppgpaints.com/#sle](http://www.ppgpaints.com/#sle).
  - 6. Pratt & Lambert Paints: [www.prattandlambert.com/#sle](http://www.prattandlambert.com/#sle).
  - 7. Sherwin-Williams Company: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).
- C. Primer Sealers: Same manufacturer as top coats.
- D. Block Fillers: Same manufacturer as top coats.
- E. Substitutions: See Section 016000 - Product Requirements.

### **2.02 PAINTS AND COATINGS - GENERAL**

- A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
  - 1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
  - 2. Supply each coating material in quantity required to complete entire project's work from a single production run.
  - 3. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
- B. Primers: As follows unless other primer is required or recommended by manufacturer of top coats; where the manufacturer offers options on primers for a particular substrate, use primer

categorized as "best" by the manufacturer.

- C. Flammability: Comply with applicable code for surface burning characteristics.
- D. Colors: To be selected from manufacturer's full range of available colors.
  - 1. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.

### **2.03 PAINT SYSTEMS - INTERIOR**

- A. Paint WI-OP-3L - Wood, Opaque, Institutional Low-Odor/VOC Latex System MPI INT 6.4R, 3 Coat:
  - 1. Prime Coat: Primer Latex, for interior wood, MPI #39.
  - 2. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
  - 3. Topcoat: Latex, interior, institutional low odor/VOC, flat (MPI Gloss Level 1), MPI #143 and Latex, interior, institutional low odor/VOC, eggshell (Gloss Level 2), MPI #144.
- B. Paint CI-OP-3L - Concrete/Masonry, Opaque, Latex, 3 Coat:
  - 1. One coat of block filler, latex, interior/exterior, MPI #4.
  - 2. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
  - 3. Topcoat: Latex, interior, institutional low odor/VOC, eggshell (MPI Level 2), MPI #144.
- C. Paint MI-OP-2A - Ferrous Metals, Primed, Alkyd, 2 Coat:
  - 1. Touch-up with alkyd primer.
  - 2. Semi-gloss: Two coats of alkyd enamel; P&L Pro-Hide Gold Interior Alkyd Semi-Gloss S889xseries.
- D. Paint Mgl-OP-3A - Galvanized Metals, Water-based light industrial coating over waterbourne primer system MPI INT 5.3K, 3 Coat:
  - 1. Prime Coat: Latex, fire-retardant, matching topcoat.
  - 2. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
  - 3. Topcoat: Light industrial coating, interior, water based, semi-gloss (Gloss level 5), MPI #153.
- E. Paint GI-OP-3L - Gypsum Board/Plaster, Latex, 3 Coat:
  - 1. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.
  - 2. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
  - 3. Topcoat: Latex, interior, institutional low odor/VOC, flat (MPI Gloss Level 1), MPI #143; Latex, interior, institutional low odor/VOC, (Gloss Level 2), MPI #144 and Latex, interior, institutional low odor/VOC, gloss (MPI Gloss Level 6), MPI #148.

### **2.04 ACCESSORY MATERIALS**

- A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Do not begin application of coatings until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- D. Test shop-applied primer for compatibility with subsequent cover materials.
- E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
  - 1. Gypsum Wallboard: 12 percent.

2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

### **3.02 PREPARATION**

- A. Clean surfaces thoroughly and correct defects prior to coating application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- F. Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
- G. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.
- H. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- I. Corroded Steel and Iron Surfaces to be Painted: Prepare using at least SSPC-SP 2 (hand tool cleaning) or SSPC-SP 3 (power tool cleaning) followed by SSPC-SP 1 (solvent cleaning).
- J. Uncorroded Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.
- K. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.

### **3.03 APPLICATION**

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's instructions.
- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- D. Apply each coat to uniform appearance.
- E. Sand metal surfaces lightly between coats to achieve required finish.
- F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

### **3.04 CLEANING**

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

### **3.05 PROTECTION**

- A. Protect finished coatings until completion of project.

B. Touch-up damaged coatings after Substantial Completion.

**END OF SECTION**

**SECTION 102113.19  
PLASTIC TOILET COMPARTMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Solid plastic toilet compartments.
- B. Urinal screens.

**1.02 REFERENCE STANDARDS**

- A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination: Coordinate the work with placement of support framing and anchors in walls and ceilings.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.
- C. Product Data: Provide data on panel construction, hardware, and accessories.
- D. Samples: Submit two samples of partition panels, 2 by 2 inch in size illustrating panel finish, color, and sheen.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Solid Plastic Toilet Compartments: Basis of Design: Hiny Hiders by Scranton Products
  - 1. Ampco Products, Inc: [www.ampco.com/#sle](http://www.ampco.com/#sle).
  - 2. Metpar Corp: [www.metpar.com/#sle](http://www.metpar.com/#sle).
  - 3. Partition Systems International of South Carolina; PolyLife HDPE Toilet Partitions: [www.psisc.com/#sle](http://www.psisc.com/#sle).
  - 4. Bradmar by Bradley Corporation.
  - 5. Substitutions: Section 016000 - Product Requirements.

**2.02 PLASTIC TOILET COMPARTMENTS**

- A. Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made of solid molded high density polyethylene (HDPE), floor-mounted headrail-braced.
  - 1. Color: To be selected from manufacturers standard range.
- B. Doors:
  - 1. Thickness: 1 inch.
  - 2. Width: 24 inch. Out swinging
  - 3. Width for Handicapped Use: 36 inch, out-swinging.
  - 4. Height: 55 inch.
- C. Panels:
  - 1. Thickness: 1 inch.
  - 2. Height: 55 inch.
- D. Pilasters:
  - 1. Thickness: 1 inch.
  - 2. Width: As required to fit space; minimum 3 inch.
- E. Screens: Without doors; to match compartments; mounted to wall with two panel brackets.

**2.03 ACCESSORIES**

- A. Pilaster Shoes: Formed chromed steel with polished finish, 3 in high, concealing ceiling

fastenings.

1. Provide ceiling attachment using two adjustable hanging studs, attached to above-ceiling framing.
- B. Head Rails: Extruded aluminum, anti-grip profile.
- C. Pilaster Brackets: Polished stainless steel.
- D. Wall Brackets: Continuous type, polished stainless steel.
- E. Attachments, Screws, and Bolts: Stainless steel , tamper proof type.
  1. For attaching panels and pilasters to brackets: Through-bolts and nuts ; tamper proof.
- F. Hardware: Natural anodized aluminum:
  1. Pivot hinges, gravity type, adjustable for door close positioning; two per door.
  2. Door Latch: Slide type with exterior emergency access feature.
  3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
  4. Coat hook with rubber bumper; one per compartment, mounted on door.
  5. Provide door pull for outswinging doors.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify correct spacing of and between plumbing fixtures.
- C. Verify correct location of built-in framing, anchorage, and bracing.

#### **3.02 INSTALLATION**

- A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.
- B. Maintain 3/8 inch to 1/2 inch space between wall and panels and between wall and end pilasters.
- C. Attach panel brackets securely to walls using anchor devices.
- D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.
- E. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

#### **3.03 TOLERANCES**

- A. Maximum Variation From True Position: 1/4 inch.
- B. Maximum Variation From Plumb: 1/8 inch.

#### **3.04 ADJUSTING**

- A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.
- B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.
- C. Adjust adjacent components for consistency of line or plane.

**END OF SECTION**

**SECTION 102600  
WALL AND DOOR PROTECTION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Corner guards.

**1.02 RELATED REQUIREMENTS**

- A. Section 061000 - Rough Carpentry: Blocking for wall and corner guard anchors.
- B. Section 092116 - Gypsum Board Assemblies: Placement of supports in stud wall construction.
- C. Section 092216 - Non-Structural Metal Framing: Placement of supports in stud wall construction.

**1.03 REFERENCE STANDARDS**

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.
- C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Indicate physical dimensions, features, wall mounting brackets with mounted measurements, anchorage details, and rough-in measurements.
- C. Shop Drawings: Include plans, elevation, sections, and attachment details. Show design and spacing of supports for protective corridor handrails, required to withstand structural loads.
- D. Manufacturer's Instructions: Indicate special procedures, perimeter conditions requiring special attention.
- E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project:
  - 1. See Section 016000 - Product Requirements, for additional provisions.
  - 2. Extra Stock Materials: One of each kind of minimum 48 inches long unit of each kind of covers for corner guards.
- G. Maintenance Data: Manufacturer's instructions for care and cleaning of each type of product. Include information about both recommended and potentially detrimental cleaning materials and methods.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver wall and door protection items in original, undamaged protective packaging. Label items to designate installation locations.
- B. Protect work from moisture damage.
- C. Protect work from UV light damage.
- D. Store products in either horizontal or vertical position, in compliance with manufacturer's instructions.

**1.06 WARRANTY**

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty: Provide 5-year manufacturer warranty for metal crash rails. Complete forms in Owner's name and register with manufacturer.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures or internal connection failures.

- b. Deterioration of materials beyond that expected of normal use, as intended by manufacturer.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Corner Guards:
  - 1. Construction Specialties, Inc: [www.c-sgroup.com/#sle](http://www.c-sgroup.com/#sle).
  - 2. Inpro: [www.inprocorp.com/#sle](http://www.inprocorp.com/#sle).
  - 3. Koroseal Interior Products: [www.koroseal.com/#sle](http://www.koroseal.com/#sle).
  - 4. Substitutions: See Section 016000 - Product Requirements.

### **2.02 PRODUCT TYPES**

- A. Corner Guards - Surface Mounted:
  - 1. Material: High impact vinyl with full height extruded aluminum retainer.
  - 2. Performance: Resist lateral impact force of 100 lbs at any point without damage or permanent set.
  - 3. Surface Burning Characteristics: Provide assemblies with flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
  - 4. Width of Wings: 2 inches.
  - 5. Corner: Radiused.
  - 6. Color: As indicated.
  - 7. Length: One piece.
  - 8. Preformed end caps.

### **2.03 FABRICATION**

- A. Fabricate components with tight joints, corners and seams.
- B. Pre-drill holes for attachment.
- C. Form end trim closure by capping and finishing smooth.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.
- B. Start of installation constitutes acceptance of project conditions.

### **3.02 INSTALLATION**

- A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to supporting construction.
- B. Position corner guard 4 inches above finished floor to 52 inches high.

### **3.03 TOLERANCES**

- A. Maximum Variation From Required Height: 1/4 inch.
- B. Maximum Variation From Level or Plane For Visible Length: 1/4 inch.

### **3.04 CLEANING**

- A. Clean wall and door protection items of excess adhesive, dust, dirt, and other contaminants.

**END OF SECTION**



**SECTION 102800  
TOILET, BATH, AND LAUNDRY ACCESSORIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Commercial toilet accessories.
- B. Commercial shower and bath accessories.
- C. Grab bars.

**1.02 RELATED REQUIREMENTS**

- A. Section 088300 - Mirrors: Other mirrors.

**1.03 REFERENCE STANDARDS**

- A. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Final Rule; current edition; (ADA Standards for Accessible Design).
- B. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- D. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2022.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- F. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.
- G. ASTM C1036 - Standard Specification for Flat Glass; 2021.
- H. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2024.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate the work with the placement of internal wall reinforcement and concealed ceiling supports to receive anchor attachments.

**1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
- C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Toilet Accessories:
  - 1. AJW Architectural Products: [www.ajw.com/#sle](http://www.ajw.com/#sle).
  - 2. ASI - American Specialties, Inc: [www.americanspecialties.com/#sle](http://www.americanspecialties.com/#sle).
  - 3. Bradley Corporation: [www.bradleycorp.com/#sle](http://www.bradleycorp.com/#sle).
  - 4. Bobrick Washroom Equipment, Inc..
- B. All items of each type to be made by the same manufacturer.

**2.02 MATERIALS**

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
- B. Stainless Steel Sheet: ASTM A666, Type 304.

- C. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.
- D. Galvanized Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.
- E. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.
- F. Adhesive: Two component epoxy type, waterproof.
- G. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

### **2.03 FINISHES**

- A. Stainless Steel: No. 4 Brushed finish, unless otherwise noted.
- B. Chrome/Nickel Plating: ASTM B456, SC 2, satin finish, unless otherwise noted.
- C. Galvanizing for Items Other than Sheet: Comply with ASTM A123/A123M; galvanize ferrous metal and fastening devices.

### **2.04 TOILET ROOM ACCESSORIES**

- A. Mirrors: Stainless steel framed, 1/4 inch thick annealed float glass; ASTM C1036.
  - 1. Annealed Float Glass: Silvering, protective and physical characteristics in compliance with ASTM C1503.
    - a. Frame: 0.05 inch angle shapes, with mitered and welded and ground corners, and tamperproof hanging system; satin finish.
    - b. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and nonabsorptive filler material.
    - c. Products:
      - 1) Bobrick B-165.
- B. Grab Bars: Stainless steel, nonslip grasping surface finish.
  - 1. Standard Duty Grab Bars:
    - a. Push/Pull Point Load: 250 pound-force, minimum.
    - b. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, exposed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
    - c. Length and Configuration: As indicated on drawings.
    - d. Products:
      - 1) Substitutions: Section 016000 - Product Requirements.
- C. Robe Hook: Stainless steel, surface-mounted, Bright-polished stainless steel. Flange is 2" x 2" (50 x 50mm). Projects 3 3/8" (85mm) from wall..
  - 1. Products:
    - a. Bobrick B-677.
    - b. Substitutions: Section 016000 - Product Requirements.

### **2.05 COMMERCIAL SHOWER AND BATH ACCESSORIES**

- A. Shower Curtain Rod: Stainless steel tube, 1 inch outside diameter, 0.04 inch wall thickness, satin-finished, with 3 inch outside diameter, minimum 0.04 inch thick satin-finished stainless steel flanges, for installation with exposed fasteners.
- B. Shower Curtain:
  - 1. Material: Opaque vinyl, 0.008 inch thick, matte finish, with antibacterial treatment, flameproof and stain-resistant.
  - 2. Size: 72 by 72 inches, hemmed edges.
  - 3. Grommets: Stainless steel; pierced through top hem on 6 inch centers.
  - 4. Color: White.
  - 5. Shower Curtain Hooks: Chrome-plated or stainless steel spring wire designed for snap closure.

- C. Folding Shower Seat: Wall-mounted surface; welded tubular seat frame, structural support members, swing-down legs, hinges, and mechanical fasteners of Type 304 stainless steel, L-shaped, right hand seat.
  - 1. Seat: Phenolic or polymeric composite one-piece seat or seat slats, of manufacturers standard color.
  - 2. Size: ADA Standards compliant.
  - 3. Products:
    - a. Seachrome Corporation; Accessibility Seats- L-Shaped Transfer with Swing-down Legs, Reversible: [www.seachrome.com/#sle](http://www.seachrome.com/#sle).
    - b. Substitutions: Section 016000 - Product Requirements.
- D. Cubical Curtain: Complete commercial system with fabric, mesh top, grommets, hooks, carriers, and track.
  - 1. Basis of Design: Clickeze by Inpro Corporation.
    - a. Track: Formatrack Bendable Cubical Track.
      - 1) Accessories: Formatrack spring clips, carriers with hooks, radius clips, swivel end caps, and other items to form a complete system.
    - b. Shower Curtain Fabric: 100% woven polyester with Visa finish; Chalet Fabric by InPro. Color to be selected from manufacturer's full range.
    - c. Open Mesh Top: Provide curtain heading of open weave nylon mesh material with #50, 1/2" holes (greater than 70%). Mesh is to be flame retardant, washable and dry-cleanable.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.
- D. Verify that field measurements are as indicated on drawings.

### **3.02 PREPARATION**

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

### **3.03 INSTALLATION**

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.
  - 1. Grab Bars: As indicated on the drawings.
  - 2. Mirrors: 3' 4" inch, measured to bottom of mirrored surface.
  - 3. Other Accessories: As indicated on the drawings.

### **3.04 PROTECTION**

- A. Protect installed accessories from damage due to subsequent construction operations.

**END OF SECTION**

**SECTION 105116  
WOOD LOCKERS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Wood lockers.

**1.02 RELATED REQUIREMENTS**

- A. Section 061000 - Rough Carpentry: Wood blocking and nailers.

**1.03 REFERENCE STANDARDS**

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.
- C. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2020.
- D. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's published data on locker construction, sizes, fittings, and accessories.
- C. Shop Drawings: Indicate locker plan layout, numbering plan, combination lock code, and key codes.
- D. Samples: Submit two samples of wood veneer panel, 4 by 4 inch in size illustrating wood grain, stain color, and sheen.
- E. Manufacturer's Installation Instructions: Indicate component installation assembly.

**1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Store lockers in a dry, ventilated area until ready for installation.

**1.07 FIELD CONDITIONS**

- A. Ambient Conditions: Maintain temperature and relative humidity within range recommended by wood locker manufacturer during and after installation of lockers.

**1.08 WARRANTY**

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Wood Lockers: Basis of Design: Cutback Side Wood Locker by The Athletic Edge.
- B. Wrestling Lockers: Basis of Design: Custom Locker by The Athletic Edge
  - 1. Substitutions: See Section 016000 - Product Requirements.

**2.02 LOCKER APPLICATIONS**

- A. Open-Front Athletic Lockers: Wood veneer-faced lockers, free-standing with matching closed base.
  - 1. Width: 21 inches.
  - 2. Depth: 24 inches.
  - 3. Height: 72 inches.
  - 4. Configuration: Single tier.

5. Fittings: Size and configuration as indicated on drawings.
  - a. Upper shelf.
  - b. Lock box with 3-dial combination lock.
  - c. Hooks: Three double prong.
  - d. Nameplate holder: 2" x 10".
  - e. Interior graphic: 12" x 12" inset logo.
  - f. Bat holder: Two per locker.
  - g. Footlocker with hinged top/seat.
    - 1) Seat cushion.
    - 2) Vented.
    - 3) Padlock hasp.
6. Ventilation: By prefabricated holes or slots in foot locker.
- B. Wrestling Lockers: Wood veneer-faced lockers, free-standing with matching closed base.
  1. Width: 21 inches.
  2. Depth: 24 inches.
  3. Height: 72 inches.
  4. Configuration: Single tier. See Drawings.
  5. Fittings: Size and configuration as indicated on drawings.
    - a. Open cubby shelf.
    - b. Lock box with 2-dial combination lock.
    - c. Coat rod.
    - d. Hooks: Three double prong.
    - e. Pocket doors.
    - f. Nameplate holder: 2" x 10".
    - g. Footlocker with hinged top/seat.
      - 1) Seat cushion.
      - 2) Vented.
      - 3) Logo graphic
      - 4) LED lighting at base
- C. Ventilation: By prefabricated holes or slots in foot locker.
- D.

### 2.03 WOOD LOCKERS

- A. Lockers: Factory assembled, made of hardwood plywood panels with dowleled and glued joints and hardwood plywood doors; fully finished inside and out; each locker capable of standing alone.
  1. Species: Maple.
  2. Interior Finish: Match locker exterior wood species and finish.
  3. Edge Banding: PVC edgebanding; color to match exposed wood surfaces.
  4. Where locker ends or sides are exposed, finish the same as fronts or provide extra panels to match fronts.
  5. Provide filler strips where indicated, securely attached to lockers.
- B. Component Thicknesses:
  1. Doors: 3/4 inch minimum thickness.
  2. Locker Body: Tops, bottoms, sides, and shelves 3/4 inch; backs 1/2 inch; minimum.
  3. End Panels and Filler Panels: 3/4 inch minimum thickness.
- C. Hinges: Concealed cabinetnetwork style hinge, minimum 120 degree opening, attached with tamperproof screws.
- D. Locks: Locker manufacturer's standard type indicated above.
- E. Built-In Lock Boxes: Same material as locker, manufacturer's standard size, with locks as indicated above.

## **2.04 MATERIALS**

- A. Wood-Based Materials:
- B. Hardwood Plywood: Veneer core; HPVA HP-1 grade as indicated, species as indicated, clear, compatible grain and color, no defects.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that prepared bases are in correct position and configuration.

### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Place and secure on prepared base.
- C. Install lockers plumb and square.
- D. Secure lockers with anchor devices to suit substrate materials.
- E. Install end panels, filler panels, and wood trim.
- F. Replace components that do not operate smoothly.

### **3.03 CLEANING**

- A. Clean locker interior and exterior surfaces.

**END OF SECTION**

## **SECTION 123600 COUNTERTOPS**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Countertops for architectural cabinet work.
- B. Wall-hung counters and vanity tops.
- C. Sinks molded into countertops.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 123553.19 - Wood Laboratory Casework: Laboratory countertops.

#### **1.03 REFERENCE STANDARDS**

- A. ANSI A161.2 - Performance Standards for Fabricated High Pressure Decorative Laminate Countertops; 1998.
- B. ANSI A208.1 - American National Standard for Particleboard; 2022.
- C. ANSI A208.2 - Medium Density Fiberboard (MDF) for Interior Applications; 2022.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.
- E. IAPMO Z124 - Plastic Plumbing Fixtures; 2022, with Editorial Revision.
- F. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.
- G. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
- H. PS 1 - Structural Plywood; 2023.

#### **1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Specimen warranty.
- C. Shop Drawings: Complete details of materials and installation ; combine with shop drawings of cabinets and casework specified in other sections.
- D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.
- E. Test Reports: Chemical resistance testing, showing compliance with specified requirements.
- F. Installation Instructions: Manufacturer's installation instructions and recommendations.
- G. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

#### **1.05 QUALITY ASSURANCE**

- A. Fabricator Qualifications: Same fabricator as for cabinets on which tops are to be installed.

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

#### **1.07 FIELD 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 absolute limits.

## **PART 2 PRODUCTS**

### **2.01 COUNTERTOPS**

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Plastic Laminate Countertops: High-pressure decorative laminate (HPDL) sheet bonded to substrate.
  - 1. Laminate Sheet: NEMA LD 3, Grade HGS, 0.048 inch nominal thickness.
    - a. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
    - b. Finish: Matte or suede, gloss rating of 5 to 20.
    - c. Surface Color and Pattern: As indicated on drawings.
    - d. Manufacturers:
      - 1) Basis of Design: Pionite & Wilsonart
      - 2) Substitutions: See Section 016000 - Product Requirements.
  - 2. Exposed Edge Treatment: Square, substrate built up to minimum 1-1/4 inch thick; covered with matching laminate.
  - 3. Back and End Splashes: Same material, same construction.
- C. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
  - 1. Flat Sheet Thickness: 1/2 inch, minimum.
  - 2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
    - a. Manufacturers:
      - 1) Formica Corporation: [www.formica.com/#sle](http://www.formica.com/#sle).
      - 2) Substitutions: See Section 016000 - Product Requirements.
    - b. Sinks and Bowls: Integral castings; minimum 3/4 inch wall thickness; comply with IAPMO Z124.
    - c. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
    - d. Color and Pattern: As indicated on drawings.
  - 3. Other Components Thickness: 3/4 inch, minimum.
  - 4. Exposed Edge Treatment: Built up to minimum 1-1/4 inch thick; square edge; use marine edge at sinks.
  - 5. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.
  - 6. Skirts: As indicated on drawings.

### **2.02 MATERIALS**

- A. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.
- B. Particleboard for Supporting Substrate: ANSI A208.1 Grade 2-M-2, 45 pcf minimum density; minimum 3/4 inch thick; join lengths using metal splines.
- C. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
- D. Joint Sealant: Mildew-resistant silicone sealant, white.

### **2.03 FABRICATION**

- A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
  - 1. Join lengths of tops using best method recommended by manufacturer.
  - 2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
  - 3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or



unnecessary cutouts or fixture holes.

- B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
  - 1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
  - 2. Height: 4 inches, unless otherwise indicated.
- C. Solid Surfacing: Fabricate tops and wall panels up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.
  - 1. Integral sinks: Shop-mount securely to countertop with adhesives, using flush configuration, as per manufacturer's instructions, and as detailed on drawings.

### **PART 3 EXECUTION**

#### **3.01 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.
- C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

#### **3.02 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.

#### **3.03 INSTALLATION**

- A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- B. Attach plastic laminate countertops using screws with minimum penetration into substrate board of 5/8 inch.
- C. Seal joint between back/end splashes and vertical surfaces.

#### **3.04 TOLERANCES**

- A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.
- B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.
- C. Field Joints: 1/8 inch wide, maximum.

#### **3.05 CLEANING**

- A. Clean countertops surfaces thoroughly.

#### **3.06 PROTECTION**

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

**END OF SECTION**

Table of Contents

Division	Section Title	Pages
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**DIVISION 21 – FIRE PROTECTION**

21 0500	General Fire Protection Requirements	6
21 0510	Basic Fire Protection Materials and Methods	4
21 1313	Fire Suppression	2

**DIVISION 22 – PLUMBING**

22 0500	General Plumbing Requirements	6
22 0510	Basic Plumbing Materials and Methods	4
22 0700	Plumbing Systems Insulation	3
22 4000	Plumbing	2

**DIVISION 23 – HEATING, VENTILATION AND AIR CONDITIONING**

23 0500	General HVAC Requirements	6
23 0510	Basic HVAC Materials and Methods	3
23 0593	Testing, Adjusting, and Balancing	3
23 0700	HVAC Systems Insulation	3
23 0900	Controls and Control Sequences	4
23 2113	Hydronic Piping Systems	9
23 7000	Ventilation and Air Conditioning	11

**FIRE PROTECTION WORK SHALL INCLUDE:**

SECTION 21 1313  
 & SECTIONS 21 0500, 21 0510 AS APPLIES

**PLUMBING WORK SHALL INCLUDE:**

SECTIONS 22 4000 & 23 2113  
 & SECTIONS 22 0500, 22 0510, 22 0700, 23 0500, 23 0510, 23 0700, & 23 0900 AS APPLIES

**VENTILATION AND AIR CONDITIONING WORK SHALL INCLUDE:**

SECTIONS 23 0900 & 23 7000  
 & SECTIONS 23 0500, 23 0510, 23 0593, & 23 0700 AS APPLIES

**SECTION 21 0500  
GENERAL FIRE PROTECTION REQUIREMENTS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. The mechanical contractor shall perform all work and furnish all materials as indicated in the mechanical plans and specifications as necessary for the successful completion of this project.

**1.3 PERMITS AND SERVICES**

- A. The mechanical contractor shall obtain all permits and arrange all inspections, give notices and pay all fees as required by the Authority Having Jurisdiction.
- B. This contractor shall coordinate any necessary site utilities including water, gas, and sewer work with local utility, owner, and other contractors to minimize disruption and downtime. ANY AND ALL CHARGES ASSESSED BY THE UTILITY AND CITY TO ACCOMMODATE THE REQUIREMENTS OF THIS PROJECT ARE THE SOLE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR. VERIFY ALL CHARGES AND COORDINATE ALL EQUIPMENT NECESSARY WITH THE UTILITY BEFORE SUBMITTING BID.

**1.4 DRAWINGS AND MEASUREMENTS**

- A. Verify all dimensions and conditions with Architectural and Structural drawings. The small scale of the drawings prohibits the indication of all offsets, fittings and accessories necessary and shall be furnished by this Contractor and required for complete and proper operation.
- B. "Existing Conditions" shown on drawings are based on existing plans and limited field investigation. The field survey was conducted to verify, as much as possible, the accuracy of the locations shown. The Contractor shall verify the accuracy of the "Existing Conditions" as shown on the drawings. As the demolition work progresses perform modifications and additions as necessary to correct for these hidden conditions and allow for the completion of the new work.
- C. The general arrangement of the mechanical systems shall be as shown on the drawings. Field changes shall have the written acceptance of the Engineer.
- D. Consult the drawings and specifications of all other trades. Layout work and coordinate with other trades, before installing any equipment, to avoid interfering with these trades or conflicting with applicable codes.
- E. The mechanical contractor shall bear full responsibility for coordinating his work with other trades to avoid conflicts in space requirements, clearances, etc. Problems arising due to lack of coordination will be the responsibility of the mechanical contractor to resolve. Extra work and/or equipment as a result of not coordinating work shall be the responsibility of the installing contractor and at no cost to the Owner.

**1.5 INSPECTION OF SITE AND DOCUMENTS**

- A. Before submitting a proposal on the work contemplated, the bidder shall thoroughly familiarize himself with the contract documents, the site, and all existing conditions and limitations that may affect the performance of his work. Any conflict noted shall be brought to the attention of the Engineer before bidding. If there is not sufficient time prior to bidding, the Contractor shall bid the larger quantity or better quality of work.
- B. No extra compensation will be allowed, because of misunderstanding the amount of work involved or the bidder's lack of knowledge, for obvious conflicts which could have been discovered or reasonably anticipated prior to bidding.

## **1.6 REGULATIONS AND CODES**

- A. All work, materials, and equipment in this contract shall comply with all applicable local, city, state and federal ordinances, regulations, and codes.

## **1.7 INSTRUCTIONS**

- A. Furnish verbal and engineer approved written instructions to Owner on all systems. Instruction shall include operating procedures, adjustments, and periodic maintenance. Furnish a copy of the written instructions and attach a letter to the Engineer, prior to final inspection, signed by Owner, attesting to date and satisfaction of instructions.

## **1.8 OPERATING AND MAINTENANCE MANUALS (3 Hard Copies & 1 Electronic Submittal via Submittal Exchange)**

- A. PRIOR TO FINAL INSPECTION, The mechanical contractor shall furnish (3) hard copies (including 1 USB drive) and (1) electronic submittal via Submittal Exchange of the O&M manuals to the Engineer, containing all pertinent data to the mechanical systems. Information shall be indexed and labeled per system and shall include catalog cuts, installation manuals, maintenance manuals, manufacturer's names, replacement parts list. Include balancing reports as specified. Include written instructions and warranty info as specified.
- B. The first section shall be indexed/labeled "WRITTEN INSTRUCTIONS & TRAINING" noting written instructions with company service contact info and shall include a list of filters for each unit. Also include document with owners signature attesting to date and satisfaction of training.
- C. The second section shall be indexed/labeled "WARRANTY INFO" and shall include a statement of guarantee on the contractors company letter head and shall include warranty statements of all equipment provided/installed under his contract with specific dates. This will note any longer/special warranties.

## **1.9 AS-CONSTRUCTED DRAWINGS (Red Lined on Plans & USB Drive containing scanned PDF)**

- A. During construction, each trade shall keep track of the major changes in the rerouting of piping and equipment, and shall note these in red on one set of drawings. This set of drawings shall be submitted with the Operation and Maintenance Manuals along with a USB drive containing a single PDF file with these same red line plans in electronic form. Most printing shops will be able to scan your trade's large plan sheets into electronic form. Contact the engineer's office if there are any questions.

## **1.10 WORKMANSHIP**

- A. Qualified individuals that are properly licensed to perform the work involved shall perform all mechanical work.

## **1.11 CUTTING AND PATCHING**

- A. This Contractor shall be responsible for all cutting and patching of holes required for passage of piping, equipment, and ducts. This also applies to the removal or installation of new equipment.
- B. All cutting of existing construction required to install or join new work, except where otherwise indicated on the plans, shall be the responsibility of this Contractor and coordinated with the General Contractor. Before making any cuts, verify exact locations and sizes with the Engineer or Owner to confirm that no structural members will be cut. Contractor shall make every effort to minimize extent of cutting existing construction.
- C. The mechanical contractor shall be responsible for patching any openings left in floors, walls, and ceilings that were caused by his/her actions. Patching shall match existing surface in color, texture and quality so that patch is indistinguishable from original surface.

## **1.12 PAINTING**

- A. Any equipment which becomes rusted or damaged during construction shall be repaired, cleaned, and repainted by this Contractor. Painting shall always be applied in two coats, one primer and one finish.

### **1.13 EQUIPMENT AND PIPE SUPPORTS**

- A. Provide all structural supporting frames, steel stands, concrete bases, and hangers as required for mechanical equipment. All floor equipment shall be set on 4" high concrete bases furnished by this Contractor, unless otherwise noted.
- B. Paint all unprotected metal, except galvanized and copper, with metal protective paint.
- C. Hangers for piping shall be large enough to encompass insulation.
- D. Provide saddles at all hangers or supports of insulated piping. Saddles for 4" and larger piping shall be fabricated of 14 gauge galvanized iron, and for smaller piping shall be fabricated of 16 gauge galvanized iron. Saddles shall be one-half the circumference of the pipe insulation and 4" shorter than the insulation inserts.
- E. Under no condition shall any pipe or duct structure be used to support another.

### **1.14 ACCESS TO EQUIPMENT**

- A. Access shall be provided to all motors, valves, dampers, controls, specialties, etc., for maintenance purposes. All access doors, access panels, removable sections, etc., required for access shall be provided. The location of the access openings relative to the mechanical equipment shall be coordinated to assure proper access to the equipment.
- B. Access openings are required for manual, motorized, fire, and smoke dampers and other devices requiring access and shall be provided in the ductwork, plenums, housings, tanks, etc., under this portion of the contract.

### **1.15 EXCAVATING AND BACKFILLING**

- A. When work to be completed by this contractor requires trenching, digging, etc. this contractor shall be responsible for properly protecting open trenches in accordance with required safety procedures. Backfill shall be placed in horizontal layers, not exceeding 9 inches in thickness. Moisten and hand or machine compact to 95% of standard proctor density. Bring fill to elevations indicated. If backfill fails the proctor density test in accordance with ASTM D-2049 and conducted by an independent testing laboratory retained by the owner, Contractor shall recompact and retest until satisfactory density is reached. This contractor shall restore the surface (whether grass, asphalt, concrete, etc.) to its original condition. Grass shall be seeded to match surrounding turf.
- B. When work is in public street, paving repairs shall be equal to and comply with municipal agency requirements. If repairs are done by municipal agency, make necessary arrangement with such agency to make the repairs. Contractor shall include cost for permits, inspection fees, work, etc. in Mechanical Bid.

### **1.16 TESTING AND ADJUSTING**

- A. At the completion of work, all parts of the installation under Division 21 shall be cleaned, lubricated, tested, and adjusted for proper operation.
- B. All piping and ductwork shall be tested and cleaned as required, by all local, state and federal codes. Tests shall be performed in the presence of the authority having jurisdiction. Written notification of test, date, and results shall be furnished to the Engineer before concealing or covering the installation.
- C. All controls shall be tested and adjusted for proper operation. Adjustments shall be made when all systems are operating which may affect the control system.
- D. The Mechanical Contractor shall test and balance all mechanical systems.
- E. A complete test shall be made of each system, adjusting fan speeds, dampers and registers so as to get the air flow called for on the plans. Pulleys shall be adjusted or changed so as to get the total air flow from each fan unit. Any additional dampers, which may be required to balance the system shall be furnished and installed by this contractor. After balancing each system, the contractor shall take readings of air flow from each opening and submit the tabulation to the engineer for approval. Tabulation shall show register size, required CFM, measured velocity and actual CFM. Balance report shall be included in the O&M Manuals.

### 1.17 GUARANTEE

- A. Warranty: The mechanical contractor shall warrant his work against failure and workmanship for a period of at least one year from the date of substantial completion, for all new work. Any work that is defective within that one-year period shall be replaced by the Contractor without charge. If longer/special warranties are noted elsewhere in the specifications, those warranties shall apply.

### 1.18 EQUIPMENT IDENTIFICATION

- A. Major equipment, rooftop units, energy recovery ventilators, electric duct heaters, heat pumps, exhaust fans, etc. shall be provided with identification as designated on the plans. Labels shall be black laminated three-layer plastic with engraved white 1/2 inch letters, and screwed or riveted to the equipment. Manufactured by Brady, Champion America, Inc., Seton.
- B. Piping shall be identified as to contents and flow direction with plastic, color coded, snap-on Seton labels. Pipes shall be labeled at each equipment connection, locate identification not to exceed 40 feet on straight runs including rises and drops, adjacent to each valve, and at each side of penetration of structure or enclosure, and at each obstruction.
- C. Valve tags shall be brass with stamped letters, tag size 1-1/2" minimum in diameter.
- D. Color coated indicators shall be installed on the ceiling grid or access door to hard lid areas to indicate all valves and other ceiling mounted equipment requiring service (example – VAV's). Each trade shall be responsible for equipment provided under their respectable trade.

### 1.19 MECHANICAL SUBMITTAL

- A. All equipment shall be as listed on the equipment schedules or approved equal.
- B. Prior Approval: Manufacturers whose product is not specified or specifically listed on the plans or in the specifications are allowed to submit information on a product that they would like to be considered as an equal to those specified or listed. By submitting this information for consideration, the product representative is indicating that the product being presented for consideration equals or exceeds the specified product in quality, performance and operating parameters. Proof of equality rests with the party making the request. The procedure for this submittal is listed below.
- C. Submit literature on product that is to be considered for prior approval. This literature shall include catalog cuts with all pertinent technical specifications, dimensions and pictures of the product.
- D. Final approval of all equipment shall be contingent on shop drawing acceptance, compliance with the specifications and performance criteria as required. General approval to bid a product does not relieve the supplier or contractor of meeting specific specification requirements.
- E. The Mechanical Contractor shall pay, provide, install and be responsible for any extra materials required due to his use of alternate accepted equipment which has installation requirements different than the specified equipment. This includes paying other trades for any extra work they are involved in due to this substitution of equipment.
- F. Literature shall be submitted so that the engineer receives it no later than 7 days prior to bid date.
- G. All approvals will be in the form of an addendum issued to all plan holders.
- H. List of Acceptable Substitutions:
  - 1. N/A.

### 1.20 SHOP DRAWINGS

- A. Before ordering any item, Contractor shall review, stamp with his approval and submit shop drawings of equipment as to be furnished under this contract.
  - 1. Electronic submittals are REQUIRED. Electronic submittals can be one combined .pdf for each of the following mechanical trades: Fire Sprinkler Drawings, Fire Sprinkler Calcs, Fire Sprinkler Materials, Plumbing, HVAC & Temperature Controls.

- B. Where the contractor is submitting shop drawings that differ from the plans and specifications, the contractor must notify the engineer in writing each variance from the plans and specifications and the Mechanical Contractor shall pay, provide, install and be responsible for any extra materials required due to his use of alternate accepted equipment which has installation requirements different than the specified equipment. This includes paying other trades for any extra work they are involved in due to this substitution of equipment.
- C. Product Data shall include, but are not limited to, the following: Manufacturer's product specifications, Manufacturer's installation instructions, standard color charts, catalog cuts, roughing-in diagrams and templates, and standard wiring diagrams.

#### **1.21 TEMPORARY HEAT**

- A. Temporary heating of the building during construction will be provided as specified in the General Conditions and Supplemental General Conditions. Under no circumstance shall the proposed HVAC equipment be brought into service as temporary heating prior to project completion without written permission from the mechanical engineer & owner.

#### **1.22 EXECUTION**

- A. Remove equipment as indicated. Demolition work shall be coordinated with the Owner. Should questions arise regarding the removal of equipment, confer with the owner before such equipment is demolished.
- B. Materials removed by demolition shall remain the property of the Owner unless specifically noted. Material the Owner does not wish to retain shall be removed and properly disposed of by the Contractor.
- C. The existing building will be in use during this construction. Schedule and carry out the work in such a manner as to cause the Owner a minimum of inconvenience due to service interruptions. Temporary services shall be installed if one area or phase of construction disrupts service to another area of the building or if equipment has to be relocated to allow construction to progress. Service interruptions shall be confined to the smallest area possible at any one time and interruptions shall be scheduled with the Owners site representative. After service has been restored following an interruption, inspect areas affected by the interruption and be responsible for returning automatically controlled equipment to the same operating condition that existed prior to the interruption.
- D. Install equipment and materials to provide required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing.
- E. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
- F. Coordinate mechanical equipment and materials installation with other building components. Verify all dimensions by field measurements. Arrange for chases, slots, and openings in other building components to allow for mechanical installations.
- G. Final locations of equipment may differ slightly from those shown on these plans. Coordinate exact location of equipment with equipment supplier, structural members, furniture layout and other trades before rough in and adjust accordingly. Pricing shall allow for a minimum of 10 ft. of difference in the actual location of items as compared to the location shown on the drawings.
- H. All penetrations for piping, ductwork, etc. which penetrate floors, fire and/or smoke walls, roofs, full height partitions and similar structures shall be sealed by the mechanical contractor with a UL system specifically approved for the application. This system must maintain the required fire rating.
- I. All mechanical systems shall be tested and cleaned as required by Authority Having Jurisdiction.
- J. The mechanical contractor shall have the full responsibility of ensuring that his/her work is performed in a safe manner and shall bear all liability associated with his/her job site safety.

- K. Upon completion of the work, the Contractor shall notify the A/E and make arrangements for a final inspection. Contractor shall provide A/E with copy of all required balance reports prior to the final inspection.
- L. After the final inspection is made, the Contractor will receive a list of items requiring adjustment, correction, replacement, or completion.
- M. The Contractor shall comply completely with all listed requirements within (40) days of receipt of list. Should the Contractor fail to perform within this time limit, the A/E and/or Owner reserves the right to have the work completed by others and the cost deducted from the contract price.

**END OF SECTION 21 0500**



**SECTION 21 0510  
BASIC FIRE PROTECTION MATERIALS AND METHODS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This section includes the following basic mechanical materials and methods to complement other Division 21 Sections.
  - 1. Piping materials and installation instructions common to most piping systems.
  - 2. Dielectric fittings.
  - 3. Mechanical sleeve seals.
  - 4. Sleeves.
  - 5. Escutcheons.
  - 6. Grout.
  - 7. Installation requirements common to equipment specification sections.

**1.3 DEFINITIONS**

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

**1.4 QUALITY ASSURANCE**

- A. All piping shall be specified in this section. Material and installation shall also be subject to state, local codes and ordinances of the area encompassing this project.
- B. Welder's Qualifications: All welder shall be qualified in accordance with ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
- C. Plastic waste, vent and roof drain piping is not allowed above any ceiling in a return air plenum.
- D. Electrical Characteristics for Mechanical Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

**PART 2 - PRODUCTS**

**2.1 PIPE, TUBE, AND FITTINGS**

- A. Provide piping and factory fabricated fittings as indicated for each service and pipe size. Fitting sizes and types shall match piping or equipment connections. Where not indicated, comply with governing regulations or manufacturer's recommendations.

**2.2 DIELECTRIC FITTINGS**

- A. General: Assembly or fitting with insulating material isolating joined dissimilar metals, to prevent galvanic action and stop corrosion.

- B. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- C. Insulating Material: Suitable for system fluid, pressure, and temperature.
- D. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.
- E. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.
- F. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

### **2.3 MECHANICAL SLEEVE SEALS**

- A. Description: Modular design, with interlocking rubber links shaped to continuously fill annular space between pipe and sleeve. Include connecting bolts and pressure plates.

### **2.4 SLEEVES**

- A. The following materials are for wall, floor, slab, and roof penetrations:
  - 1. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
  - 2. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
  - 3. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
  - 4. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

### **2.5 ESCUTCHEONS**

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Cast-Brass Type: With set screw.
  - 1. Finish: Polished chrome-plated.
- C. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
  - 1. Finish: Polished chrome-plated.

### **2.6 GROUT**

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
  - 1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
  - 2. Design Mix: 5000-psi, 28-day compressive strength.
  - 3. Packaging: Premixed and factory packaged.

## **PART 3 - EXECUTION**

### **3.1 MECHANICAL DEMOLITION**

- A. Refer to Division 1 Sections "Cutting and Patching" and "Selective Demolition" for general demolition requirements and procedures.
- B. Disconnect, demolish, and remove mechanical systems, equipment, and components indicated to be removed.
  - 1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
  - 2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
  - 3. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
  - 4. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
  - 5. Equipment to Be Removed: Disconnect and cap services and remove equipment.

6. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
  7. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
- C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

### 3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 21 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- D. Do not run piping through electrical or electronic equipment spaces and enclosures unless unavoidable. Install drip pan under piping that must be run through electrical spaces, if approved by local authority.
- E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- G. Install piping to permit valve servicing.
- H. Install piping to allow maximum possible headroom unless specific mounting heights or slopes are indicated.
- I. Install piping at indicated slopes, or level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- J. Install piping free of sags and bends.
- K. Install fittings for changes in direction and branch connections.
- L. Install piping to allow application of insulation.
- M. Select system components with pressure rating equal to or greater than system operating pressure.
- N. Install escutcheons for penetrations of walls, ceilings, and floors.
- O. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
- P. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
  1. Install steel pipe for sleeves smaller than 6 inches in diameter.
  2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
  3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

- Q. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
  - 1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- R. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials conforming to the 25/50 flame spread and smoke developed rating.
- S. Verify final equipment locations for roughing-in.
- T. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

### **3.3 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS**

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

**END OF SECTION 21 0510**

**SECTION 21 1313  
FIRE PROTECTION**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. The work in this section of the specification and the accompanying drawings consists of performing all labor, equipment, accessories, and materials and in performing all operations necessary for the installation of a complete fire protection system as described herein and/or shown on the Drawings. This includes all piping, wiring, and materials necessary for complete systems though not specifically mentioned or shown.
- B. Prior to bidding: It shall be the responsibility of this contractor to verify water supply pressures and flow sufficient to meet the design requirements to serve this facility. If the water supply system is not of adequate pressures and flow for installation without a fire pump and/or storage tank, it shall be the responsibility of this contractor to notify the engineer at once so that an addendum can be sent out to coordinate & address the additional fire pump/storage tank requirements.

**1.3 QUALITY ASSURANCE**

- A. The Contractor for the Fire Protection installation shall be a qualified Fire Protection Contractor regularly engaged in the installation of Automatic Fire Sprinkler Systems and other Fire Protection Equipment.
- B. All material, equipment, valves, and devices installed or furnished under this section shall be listed or approved for use in the fire protection installation by the authorities, agencies, codes, and standards named in this Section of the Specifications:
  - 1. Underwriters Laboratories – Approved Fire Protection
  - 2. NFPA Pamphlet No. 13
- C. The Fire Protection System shall be designed and installed to comply with the following standards and/or codes of the latest issue:
  - 1. NFPA Pamphlet No. 13 – Sprinkler Systems

**1.4 WORKING DRAWINGS**

- A. Before commencing with the sprinkler installation, the Fire Protection Contractor shall submit Working Drawings to the Authorities Having Jurisdiction and agencies specified for review and approval and/or acceptance. Following approval by Authorities Having Jurisdiction, the Contractor shall submit the Drawings to the Architect/Engineer in accordance with the General Conditions and Section 210500, General Fire Protection Requirements – Shop Drawings.

**1.5 INSPECTION AND TESTS**

- A. All inspections, examinations, and tests required by the authorities and agencies specified shall be arranged and paid for by the Fire Protection Contractor as necessary, to obtain complete and final acceptance of the Fire Protection System.

**1.6 CONTRACTOR'S CERTIFICATE**

- A. After completion of the fire protection installation and at the start of the guarantee year, the Fire Protection Contractor shall execute and file five (5) copies of the "Contractor's Material and Test Certificate, Sprinkler systems -Water Spray Systems" with the Engineer. At the time of final inspection the following maintenance shall be performed:
  - 1. Operation of all control valves.
  - 2. Lubrication of operation stems of all interior control valves.
  - 3. Operation of alarm bell.
  - 4. Cleaning of sprinkler valves.
  - 5. Lubrication of fire protection inlet water connections.

**PART 2 - PRODUCTS**

**2.1 PIPING REQUIREMENTS**

- A. In all exposed structure areas, such as storage rooms, etc., piping material shall be iron pipe. In concealed areas throughout CPVC will not be acceptable. All piping to be rated for fire sprinkler installation.

**2.2 PROTECTIVE CAGES**

- A. N/A.

**2.3 QUICK RESPONSE SPRINKLER HEADS**

- A. Quick response sprinkler heads shall be standard semi-recessed pendant type or concealed as noted in all locations where piping is concealed above ceilings. Color as noted on plans.
- B. Quick response sprinkler heads shall be standard upright type where piping is installed exposed. Upright heads shall be plain brass finish.
- C. Quick response sidewall sprinkler heads, where permitted, shall be semi-recessed in finished rooms with finish as noted on plans, plain brass elsewhere.
- D. Temp rating of sprinkler heads shall be in accordance with requirements of approving authorities.
- E. Sprinkler heads shall be installed centered in the ceiling tile where applicable. Three locations are acceptable in 2 foot by 4 foot ceiling tiles.
- F. Any ceiling lower than 8'-0" shall have concealed pendant heads.

**2.4 WATERFLOW SWITCHES AND ALARMS**

- A. Existing to remain and be utilized.

**2.5 DRAINS**

- A. Existing to remain and be utilized.

**2.6 SIAMESE FIRE DEPARTMENT CONNECTION**

- A. Existing to remain be utilized.

**2.7 DOUBLE CHECK BACKFLOW PREVENTER**

- A. Existing to remain be utilized.

**END OF SECTION 21 1313**

**SECTION 22 0500  
GENERAL PLUMBING REQUIREMENTS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. The mechanical contractor shall perform all work and furnish all materials as indicated in the mechanical plans and specifications as necessary for the successful completion of this project.

**1.3 PERMITS AND SERVICES**

- A. The mechanical contractor shall obtain all permits and arrange all inspections, give notices and pay all fees as required by the Authority Having Jurisdiction.
- B. This contractor shall coordinate any necessary site utilities including water, gas, and sewer work with local utility, owner, and other contractors to minimize disruption and downtime. **ANY AND ALL CHARGES ASSESSED BY THE CITY OR UTILITY TO ACCOMMODATE THE REQUIREMENTS OF THIS PROJECT ARE THE SOLE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR. VERIFY ALL CHARGES AND COORDINATE ALL EQUIPMENT NECESSARY WITH THE UTILITY BEFORE SUBMITTING BID.**

**1.4 DRAWINGS AND MEASUREMENTS**

- A. Verify all dimensions and conditions with Architectural and Structural drawings. The small scale of the drawings prohibits the indication of all offsets, fittings and accessories necessary and shall be furnished by this Contractor and required for complete and proper operation.
- B. "Existing Conditions" shown on drawings are based on existing plans and limited field investigation. The field survey was conducted to verify, as much as possible, the accuracy of the locations shown. The Contractor shall verify the accuracy of the "Existing Conditions" as shown on the drawings. As the demolition work progresses perform modifications and additions as necessary to correct for these hidden conditions and allow for the completion of the new work.
- C. The general arrangement of the mechanical systems shall be as shown on the drawings. Field changes shall have the written acceptance of the Engineer.
- D. Consult the drawings and specifications of all other trades. Layout work and coordinate with other trades, before installing any equipment, to avoid interfering with these trades or conflicting with applicable codes.
- E. The mechanical contractor shall bear full responsibility for coordinating his work with other trades to avoid conflicts in space requirements, clearances, etc. Problems arising due to lack of coordination will be the responsibility of the mechanical contractor to resolve. Extra work and/or equipment as a result of not coordinating work shall be the responsibility of the installing contractor and at no cost to the Owner.

**1.5 INSPECTION OF SITE AND DOCUMENTS**

- A. Before submitting a proposal on the work contemplated, the bidder shall thoroughly familiarize himself with the contract documents, the site, and all existing conditions and limitations that may affect the performance of his work. Any conflict noted shall be brought to the attention of the Engineer before bidding. If there is not sufficient time prior to bidding, the Contractor shall bid the larger quantity or better quality of work.
- B. No extra compensation will be allowed, because of misunderstanding the amount of work involved or the bidder's lack of knowledge, for obvious conflicts which could have been discovered or reasonably anticipated prior to bidding.

**1.6 REGULATIONS AND CODES**

- A. All work, materials, and equipment in this contract shall comply with all applicable local, city, state and federal ordinances, regulations, and codes.

## 1.7 INSTRUCTIONS

- A. Furnish verbal and engineer approved written instructions to Owner on all systems. Instruction shall include operating procedures, adjustments, and periodic maintenance. Furnish a copy of the written instructions and attach a letter to the Engineer, prior to final inspection, signed by Owner, attesting to date and satisfaction of instructions.

## 1.1 OPERATING AND MAINTENANCE MANUALS (3 Hard Copies & 1 Electronic Submittal via Submittal Exchange)

- A. PRIOR TO FINAL INSPECTION, The mechanical contractor shall furnish (3) hard copies (including 1 USB drive) and (1) electronic submittal via Submittal Exchange to the Engineer, containing all pertinent data to the mechanical systems. Information shall be indexed and labeled per system and shall include catalog cuts, installation manuals, maintenance manuals, manufacturer's names, replacement parts list. Include balancing reports as specified. Include written instructions and warranty info as specified.
- B. The first section shall be indexed/labeled "WRITTEN INSTRUCTIONS & TRAINING" noting written instructions with company service contact info and shall include a list of filters for each unit. Also include document with owners signature attesting to date and satisfaction of training.
- C. The second section shall be indexed/labeled "WARRANTY INFO" and shall include a statement of guarantee on the contractors company letter head and shall include warranty statements of all equipment provided/installed under his contract with specific dates. This will note any longer/special warranties.

## 1.2 AS-CONSTRUCTED DRAWINGS (Red Lined on Plans & USB Drive containing scanned PDF)

- A. During construction, each trade shall keep track of the major changes in the rerouting of piping and equipment, and shall note these in red on one set of drawings. This set of drawings shall be submitted with the Operation and Maintenance Manuals along with a USB drive containing a single pdf file with these same red line plans in electronic form. Most printing shops will be able to scan your trade's large plan sheets into electronic form. Contact the engineer's office if there are any questions.

## 1.3 WORKMANSHIP

- A. Qualified individuals that are properly licensed to perform the work involved shall perform all mechanical work.

## 1.4 CUTTING AND PATCHING

- A. This Contractor shall be responsible for all cutting and patching of holes required for passage of piping, equipment, and ducts. This also applies to the removal or installation of new equipment.
- B. All cutting of existing construction required to install or join new work, except where otherwise indicated on the plans, shall be the responsibility of this Contractor and coordinated with the Construction Manager. Before making any cuts, verify exact locations and sizes with the Construction Manager to confirm that no structural members will be cut. Contractor shall make every effort to minimize extent of cutting existing construction.
- C. The mechanical contractor shall be responsible for patching any openings left in floors, walls, and ceilings that were caused by his/her actions. Patching shall match existing surface in color, texture and quality so that patch is indistinguishable from original surface.

## 1.5 PAINTING

- A. Any equipment which becomes rusted or damaged during construction shall be repaired, cleaned, and repainted by this Contractor. Painting shall always be applied in two coats, one primer and one finish.

## 1.6 EQUIPMENT AND PIPE SUPPORTS

- A. Provide all structural supporting frames, steel stands, concrete bases, and hangers as required for mechanical equipment. All floor equipment shall be set on 4" high concrete bases furnished by this Contractor, unless otherwise noted.
- B. Paint all unprotected metal, except galvanized and copper, with metal protective paint.



- C. Hangers for piping shall be large enough to encompass insulation.
- D. All piping support must be installed such that it does not compromise the vapor seal of the insulation.
- E. Provide saddles at all hangers or supports of insulated piping. Saddles for 4" and larger piping shall be fabricated of 14 gauge galvanized iron, and for smaller piping shall be fabricated of 16 gauge galvanized iron. Saddles shall be one-half the circumference of the pipe insulation and 4" shorter than the insulation inserts.
- F. Under no condition shall any pipe or duct structure be used to support another.

#### **1.7 ACCESS TO EQUIPMENT**

- A. Access shall be provided to all motors, valves, dampers, controls, specialties, etc., for maintenance purposes. All access doors, access panels, removable sections, etc., required for access shall be provided. The location of the access openings relative to the mechanical equipment shall be coordinated to assure proper access to the equipment.
- B. Access openings are required for manual, motorized, fire, and smoke dampers and other devices requiring access and shall be provided in the ductwork, plenums, housings, tanks, etc., under this portion of the contract.

#### **1.8 EXCAVATING AND BACKFILLING**

- A. When work to be completed by this contractor requires trenching, digging, etc. this contractor shall be responsible for properly protecting open trenches in accordance with required safety procedures. Backfill shall be placed in horizontal layers, not exceeding 9 inches in thickness. Moistened and hand or machine compact to 95% of standard proctor density. Bring fill to elevations indicated. If backfill fails the proctor density test in accordance with ASTM D-2049 and conducted by an independent testing laboratory retained by the owner, Contractor shall recompact and retest until satisfactory density is reached. This contractor shall restore the surface (whether grass, asphalt, concrete, etc.) to its original condition. Grass shall be seeded to match surrounding turf.
- B. When work is in public street, paving repairs shall be equal to and comply with municipal agency requirements. If repairs are done by municipal agency, make necessary arrangement with such agency to make the repairs. Contractor shall include cost for permits, inspection fees, work, etc. in Mechanical Bid.

#### **1.9 TESTING AND ADJUSTING**

- A. At the completion of work, all parts of the installation under Division 23 shall be cleaned, lubricated, tested, and adjusted for proper operation.
- B. All piping and ductwork shall be tested and cleaned as required, by all local, state and federal codes. Tests shall be performed in the presence of the authority having jurisdiction. Written notification of test, date, and results shall be furnished to the Engineer before concealing or covering the installation.
- C. All controls shall be tested and adjusted for proper operation. Adjustments shall be made when all systems are operating which may affect the control system.
- D. An Independent Testing & Balancing Agent shall test and balance all mechanical systems as specified in Section 23 0593.

#### **1.10 GUARANTEE**

- A. Warranty: The mechanical contractor shall warrant his work against failure and workmanship for a period of at least one year from the date of substantial completion, for all new work. Any work that is defective within that one-year period shall be replaced by the Contractor without charge. If longer/special warranties are noted elsewhere in the specifications, those warranties shall apply.

#### **1.11 EQUIPMENT IDENTIFICATION**

- A. Major mechanical equipment, rooftop units, energy recovery ventilators, electric duct heaters, heat pumps, exhaust fans, etc. shall be provided with identification as designated on the plans.

Labels shall be black laminate three-layer plastic with engraved 1/2 inch white letters, adhered, screwed, or riveted to the equipment. Manufactured by Brady, Champion America/Seton.

- B. Piping shall be identified as to contents and flow direction with plastic, color coded, snap-on or adhesive labels. Manufactured by Brady, Champion America/Seton.
  - 1. Labeling shall be located:
    - a. Adjacent to each valve.
    - b. At each side of and at each obstruction.
    - c. At each branch.
    - d. At each cap for future.
    - e. At each takeoff.
    - f. At each side of penetration of structure or enclosure.
    - g. At each equipment connection.
    - h. At all access doors.
    - i. A maximum of every 40 feet on straight runs of piping including rises and drops.
    - j. Minimum one label per room/space.
- C. Valve tags shall be brass with stamped letters, tag size 1-1/2" minimum in diameter.
  - 1. Provide typed valve lists in each O&M binder. Valve lists shall include the valve number, location, and purpose of each valve, and any other necessary information such as the required opening or closing of another valve when one valve is to be opened or closed.
- D. Color coded indicators shall be installed on the ceiling grid or access door to hard lid areas to indicate all valves and other ceiling mounted equipment requiring service (example – VAV's). Each trade shall be responsible for equipment provided under their respectable trade.
  - 1. Each ceiling label shall be color coded laminated engraved plastic, 1/16" thick, 2.5" wide by 0.75" tall, with white lettering centered on each label. Label to be adhered to the acoustic ceiling tile grid. Seton Style AV0175 or similar.

#### 1.12 MECHANICAL SUBMITTAL

- A. All equipment shall be as listed on the equipment schedules or approved equal.
- B. Prior Approval: Manufacturers whose product is not specified or specifically listed on the plans or in the specifications are allowed to submit information on a product that they would like to be considered as an equal to those specified or listed. By submitting this information for consideration, the product representative is indicating that the product being presented for consideration equals or exceeds the specified product in quality, performance and operating parameters. Proof of equality rests with the party making the request. The procedure for this submittal is listed below.
- C. Submit literature on product that is to be considered for prior approval. This literature shall include catalog cuts with all pertinent technical specifications, dimensions and pictures of the product.
- D. Final approval of all equipment shall be contingent on shop drawing acceptance, compliance with the specifications and performance criteria as required. General approval to bid a product does not relieve the supplier or contractor of meeting specific specification requirements.
- E. The Mechanical Contractor shall pay, provide, install and be responsible for any extra materials required due to his use of alternate accepted equipment which has installation requirements different than the specified equipment. This includes paying other trades for any extra work they are involved in due to this substitution of equipment.
- F. Literature shall be submitted so that the engineer receives it no later than 7 days prior to bid date.
- G. All approvals will be in the form of an addendum issued to all plan holders.
- H. List of Acceptable Substitutions:
  - 1. Floor Drains and Clean Outs: Wade, Zurn, Smith, Josam, Ancon, Watts.
  - 2. Valves: Crane, Hammond, Watts, Rockwell, Milwaukee Valve Co., Mueller.
  - 3. Plumbing Fixtures: American Standard, Kohler, Crane, Elkay, Just, Zurn, Fiat

4. Fixture Brass: American Standard, Kohler, Zurn, Sloan, T & S Brass, Chicago, Bradley, Swan, Woodford Mfg., Delta
5. Point of Use Thermostatic Mixing Valves: Watts, Zurn, Lawler
6. Lav Premolded Insulation Kit: Plumberex, Truebro
7. Toilet Seats: Kohler, Church, Beneke, Bemis, Olsonite

### **1.13 SHOP DRAWINGS**

- A. Before ordering any item, Contractor shall review, stamp with his approval and submit shop drawings of equipment as to be furnished under this contract.
  1. Electronic submittals are REQUIRED. Electronic submittals can be one combined PDF file. for each of the following mechanical trades: Fire Sprinkler, Plumbing, HVAC, & Temperature Controls.
- B. Where the contractor is submitting shop drawings that differ from the plans and specifications, the contractor must notify the engineer in writing each variance from the plans and specifications and the Mechanical Contractor shall pay, provide, install and be responsible for any extra materials required due to his use of alternate accepted equipment which has installation requirements different than the specified equipment. This includes paying other trades for any extra work they are involved in due to this substitution of equipment.
- C. Product Data shall include, but are not limited to, the following: Manufacturer's product specifications, Manufacturer's installation instructions, standard color charts, catalog cuts, roughing-in diagrams and templates, and standard wiring diagrams.

### **1.14 TEMPORARY HEAT**

- A. NA.

### **1.15 EXECUTION**

- A. Remove equipment as indicated. Demolition work shall be coordinated with the Owner. Should questions arise regarding the removal of equipment, confer with the owner before such equipment is demolished.
- B. Materials removed by demolition shall remain the property of the Owner unless specifically noted. Material the Owner does not wish to retain shall be removed and properly disposed of by the Contractor.
- C. The existing building will be in use during this construction. Schedule and carry out the work in such a manner as to cause the Owner a minimum of inconvenience due to service interruptions. At no additional costs, temporary services shall be installed if one area or phase of construction disrupts service to another area of the building or if equipment has to be relocated to allow construction to progress. Service interruptions shall be confined to the smallest area possible at any one time and interruptions shall be scheduled with the Owners site representative. After service has been restored following an interruption, inspect areas affected by the interruption and be responsible for returning automatically controlled equipment to the same operating condition that existed prior to the interruption. Install equipment and materials to provide required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing.
- D. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
- E. Coordinate mechanical equipment and materials installation with other building components. Verify all dimensions by field measurements. Arrange for chases, slots, and openings in other building components to allow for mechanical installations.
- F. Final locations of equipment may differ slightly from those shown on these plans. Coordinate exact location of equipment with equipment supplier, structural members, furniture layout and other trades before rough in and adjust accordingly. Pricing shall allow for a minimum of 10 ft. of difference in the actual location of items as compared to the location shown on the drawings.

- G. All penetrations for piping, ductwork, etc. which penetrate floors, fire and/or smoke walls, roofs, full height partitions and similar structures shall be sealed by the mechanical contractor with a UL system specifically approved for the application. This system must maintain the required fire rating.
- H. All mechanical systems shall be tested and cleaned as required by Authority Having Jurisdiction.
- I. The mechanical contractor shall have the full responsibility of ensuring that his/her work is performed in a safe manner and shall bear all liability associated with his/her job site safety.
- J. Upon completion of the work, the Contractor shall notify the A/E and make arrangements for a final inspection. Contractor shall provide A/E with copy of all required balance reports prior to the final inspection.
- K. After the final inspection is made, the Contractor will receive a list of items requiring adjustment, correction, replacement, or completion.
- L. The Contractor shall comply completely with all listed requirements within (40) days of receipt of list. Should the Contractor fail to perform within this time limit, the A/E and/or Owner reserves the right to have the work completed by others and the cost deducted from the contract price.

**END OF SECTION 22 0500**

**SECTION 22 0510**  
**BASIC PLUMBING MATERIALS AND METHODS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This section includes the following basic mechanical materials and methods to complement other Division 22 Sections.
  1. Piping materials and installation instructions common to most piping systems.
  2. Dielectric fittings.
  3. Mechanical sleeve seals.
  4. Sleeves.
  5. Escutcheons.
  6. Grout.
  7. Mechanical Demolition.
  8. Installation requirements common to equipment specification sections.

**1.3 DEFINITIONS**

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

**1.4 QUALITY ASSURANCE**

- A. All piping shall be specified in this section. Material and installation shall also be subject to state, local codes and ordinances of the area encompassing this project.
- B. Welder's Qualifications: All welder shall be qualified in accordance with ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
- C. Potable-water piping and components shall comply with NSF 14 and NSF 61 Annex G. Plastic piping components shall be marked with "NSF-pw."
- D. Plastic vent piping is not allowed above any ceiling in a return air plenum.
- E. Electrical Characteristics for Mechanical Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

**PART 2 - PRODUCTS**

**2.1 PIPE, TUBE, AND FITTINGS**

- A. Provide piping and factory fabricated fittings as indicated for each service and pipe size. Fitting sizes and types shall match piping or equipment connections. Where not indicated, comply with governing regulations or manufacturer's recommendations.

## 2.2 SANITARY WASTE, AND VENT PIPING

- A. Below Grade: Extra heavy weight, coated cast iron soil pipe, hub-&-spigot, ASTM A 74, with TY-seal double seal, premolded one piece Neoprene compression type gasket, ASTM C 564, or lead/oakum joint materials, FSQQ-C-40.
  - 1. Service weight "No-Hub" cast iron soil pipe, FS WW-P-401, with Neoprene gasket, ASTM C564, and stainless steel drawband.
  - 2. Where permitted by plumbing and building codes, schedule 40 Polyvinyl Chloride sewer pipe (PVC), ASTM D 2729, with sewer fittings ASTM D 2729, and solvent cement, ASTM D 2564.
- B. Above Grade: Service weight cast iron soil pipe, Hub-&-Spigot, ASTM A 74, with premolded one piece Neoprene compression type gasket, ASTM C 564, or lead/oakum joint materials, FS QQ-C-40.
  - 1. Service weight "No-Hub" cast iron soil pipe, CISPI standard 301, or FS WW-P-401, with Neoprene gasket, ASTM C564, and stainless steel drawband, conforming to CISPI standard 310.
  - 2. Where permitted by plumbing and building codes, schedule 40 Polyvinyl Chloride (PVC), type DWV, ASTM D 2665; with schedule 40 DWV fittings, ASTM D 2665 and patterns conforming to ASTM D 3311. Solvent cement, ASTM D 3138.
    - a. ***Not allowed in return air plenums.***

## 2.3 DOMESTIC WATER (HOT, RECIRCULATING HOT, AND COLD WATER) IN BUILDING ABOVE GROUND

- A. Piping drops within walls shall be by Type "L" hard drawn copper water tube. Fittings wrought copper, solder joints. Joints 95-5 or lead free solder.
- B. PEX tubing will **not** be acceptable.

## 2.4 DIELECTRIC FITTINGS

- A. General: Assembly or fitting with insulating material isolating joined dissimilar metals, to prevent galvanic action and stop corrosion.
- B. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- C. Insulating Material: Suitable for system fluid, pressure, and temperature.
- D. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.
- E. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.
- F. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

## 2.5 MECHANICAL SLEEVE SEALS

- A. Description: Modular design, with interlocking rubber links shaped to continuously fill annular space between pipe and sleeve. Include connecting bolts and pressure plates.

## 2.6 SLEEVES

- A. The following materials are for wall, floor, slab, and roof penetrations:
  - 1. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
  - 2. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
  - 3. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
  - 4. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

## 2.7 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Cast-Brass Type: With set screw.
  - 1. Finish: Polished chrome-plated.
- C. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
  - 1. Finish: Polished chrome-plated.

## 2.8 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
  - 1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
  - 2. Design Mix: 5000-psi, 28-day compressive strength.
  - 3. Packaging: Premixed and factory packaged.

## PART 3 - EXECUTION

### 3.1 MECHANICAL DEMOLITION

- A. Refer to Division 1 Sections "Cutting and Patching" and "Selective Demolition" for general demolition requirements and procedures.
- B. Disconnect, demolish, and remove mechanical systems, equipment, and components indicated to be removed.
  - 1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
  - 2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
  - 3. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
  - 4. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
  - 5. Equipment to Be Removed: Disconnect and cap services and remove equipment.
  - 6. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
  - 7. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
- C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

### 3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- D. Do not run piping through electrical or electronic equipment spaces and enclosures unless unavoidable. Install drip pan under piping that must be run through electrical spaces, if approved by local authority.

- E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- G. Install piping to permit valve servicing.
- H. Install piping to allow maximum possible headroom unless specific mounting heights or slopes are indicated.
- I. Install piping at indicated slopes, or level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- J. Install piping free of sags and bends.
- K. Install fittings for changes in direction and branch connections.
- L. Install piping to allow application of insulation.
- M. Select system components with pressure rating equal to or greater than system operating pressure.
- N. Install escutcheons for penetrations of walls, ceilings, and floors.
- O. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
- P. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials conforming to the 25/50 flame spread and smoke developed rating.
- Q. Verify final equipment locations for roughing-in.
- R. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

### **3.3 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS**

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

**END OF SECTION 22 0510**



**SECTION 22 0700  
PLUMBING SYSTEMS INSULATION**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. The work in this section of the specification and the accompanying drawings consists of performing all labor, equipment, accessories, and materials and in performing all operations necessary for the installation of all insulation for the plumbing, and sealing of sleeves.
- B. Work to be insulated includes the following:
  - 1. All domestic cold, hot, and recirculating hot water piping, valves, and fittings.
  - 2. All sleeves.
- C. All insulation work shall be installed in a workmanlike manner by skilled workmen engaged in this type of work.
- D. Fire-Test-Response Characteristics: Provide products with flame-spread and smoke-developed indices of 25 and 50, respectively, according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction.

**1.3 SUBMITTALS**

- A. Shop drawings/product data as specified in Section 22 0500 shall include the following:
  - 1. Product Data: Identify thermal conductivity, thickness, and jackets (both factory installed and field applied, if any), for each type of product indicated.

**1.4 COORDINATION**

- A. Coordinate clearance requirements with duct Installer for insulation application.
- B. Coordinate clearance requirements with piping Installer for insulation application.
- C. Coordinate size and location of supports, hangers, and insulation shields.

**PART 2 - PRODUCTS**

**2.1 NEW DOMESTIC COLD, HOT, AND RECIRCULATING HOT WATER PIPING INSULATION**

- A. All piping in concealed and exposed areas shall be insulated with fiberglass pipe insulation with all service jacket. Jacket shall be factory-applied, and, where specified, with white foil scrim-kraft vapor barrier. Insulation shall be Johns-Manville Micro-Lok 850 HP, or accepted equal.
- B. For pipe sizes 1" and less – insulation thickness shall be ½". For pipe sizes of 1-1/4"-2" – insulation thickness shall be 1". For pipe sizes of 2-1/2" and larger – insulation thickness shall be 1-1/2".
- C. Fittings, valves, flanges, etc. shall be insulated with fiberglass blanket, Johns-Manville Microlite or pre-cut mitered sections for elbows, J-M Micro-Lok (1lb/cu. ft. density).
- D. Encase pipe fitting insulation with one piece pre-molded Zeston 2000 PVC fitting covers having flame spread index of 25 or less, and smoke developed index of 50 or less, as tested by ASTM E84 (NFPA 255) method.
- E. Provide sheet metal insulation shields at all hanger locations.

**PART 3 - EXECUTION**

**3.1 GENERAL APPLICATION**

- A. All insulation shall be applied on clean, dry surfaces. All joints shall be snugly butted against the adjoining piece and all joints, seams, voids, flat spots, etc., shall be filled with insulation cement. Do not use cut pieces or scraps abutting each other.

- B. Where double layers are installed, the first layer shall be fastened with binding wire. All joints shall be staggered between the two layers.
- C. Insulation on all cold surfaces must be applied in a continuous, unbroken vapor seal. Hangers, supports, anchors, etc., that are secured directly to cold surfaces must be adequately insulated and vapor sealed to prevent condensation.
- D. All surface finishes shall be extended to protect all surfaces, ends, and raw edges of insulation.
- E. All insulation materials shall be installed in strict accordance with manufacturer's instructions, using recommended adhesives, mastics and coatings applied at specific coverage per gallon and temperature conditions.
- F. Extend insulation without interruption through walls, floors and similar penetrations, except where otherwise indicated.
- G. Maintain integrity of vapor-barrier jackets on insulation, and protect to prevent puncture or other damage.
- H. Do not apply insulation to equipment, breechings, or stacks while hot.
- I. Do not insulate boiler manholes, handholes, cleanouts, ASME stamp, and manufacturer's nameplate. Provide neatly beveled edge at interruptions of insulation.
- J. Provide removable insulation sections to cover parts of equipment, which must be opened periodically for maintenance; include metal vessel covers, fasteners, flanges, frames and accessories.
- K. Repair damaged sections of existing mechanical insulation, both previously damaged or damaged during this construction period. Use insulation of same thickness as existing insulation, install new jacket lapping and sealed over existing.
- L. Insulation installer shall advise Contractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration.

### 3.2 MINERAL-FIBER PIPE INSULATION APPLICATION

- A. Fittings, valves, and flange insulation shall be wrapped firmly under compression (minimum 2:1) to a thickness equal to the adjoining insulation, secured with No. 20 gauge galvanized annealed steel wire, and finished with a smoothing coat of mastic, Johns-Manville No. 375 Insulating and Finishing Cement or equal.
- B. Cold Fittings, Valves, Flanges, etc., shall be additionally sealed with a layer of resin coated glass mesh, such as Johns-Manville Duramesh 207 glass cloth, embedded between two 1/16" thick coats of vapor barrier coating, Benjamin Foster 30-35 or equal. Lap the sealed glass cloth at least 2" on itself and the adjoining insulation.
- C. Premolded Insulation Valve and Fitting Covers shall be installed by tack fastening, banding, or taping as required by manufacturer.
- D. Expansion Joints: For expansion joints, a tube of pipe insulation shall be fabricated that will allow the expansion joint to move within the tube. The insulating tube shall be fastened at one end of the pipe or equipment and the other end shall be free to slide over the adjacent insulated piping. Provide an aluminum jacket over the insulated pipe to provide a smooth surface on which the insulated tube may slide.
- E. Insulation Under Hangers: Pipe hangers shall encompass the insulation and shall have sheet metal saddles furnished by the Mechanical Contractor.
- F. Inserts shall be installed at all hanger locations. Inserts between the pipe and pipe hangers shall consist of 13lb/cubic foot hydrous calcium silicate pipe insulation, or wood blocking, of thickness equal to the adjoining insulation and shall be provided with vapor barriers where required. Insulation inserts shall not be less than the following lengths:
  - 1. 1/2" to 1-1/2" pipe size 10" long
  - 2. 3" to 6" pipe size 12" long
  - 3. 8" and larger pipe size 16" long

- G. On all piping the full thickness of insulation and jacket shall run continuously under the sheet metal pipe saddle and through the pipe hanger (pipe hanger shall be large enough to permit full insulation thickness.)

### **3.3 SEALING OF SLEEVES**

- A. All sleeves for pipes, ductwork, etc., furnished under Division 22 of specifications, penetrating floors, fire and/or smoke walls and full height partitions, including chase walls, shall be sealed in accordance with the following:
  - 1. All insulated services shall have the specified insulation terminated on either side of sleeve. Services which require a vapor barrier jacket shall have segment through sleeve insulated with calcium silicate having a minimum thickness same as specified for service. Vapor barrier jacket shall be uninterrupted. Entire void space between inside of sleeve and outside of duct, pipe, and/or calcium silicate insulation shall be packed with fiber insulation, conforming to HHI-521E Type 3 or HHI-558B Form A and having an ASTM fire class E-84 with fiber melt point in excess of 2000 degrees F., to a point 1/8 inch from ends of pipe sleeve. After void is packed with fiber insulation, services which are specified to be insulated shall have a section of insulation installed on each side of sleeve, insulation to be fitted tight to sleeve insulation. Balance of space in sleeve to be filled with nonhardening silicone conforming to TTS-00230 and of type which will allow 50 percent movement in one direction.
  - 2. Contractor is herein given the option to provide Pipe Shield, Inc., fire rated wall and floor sleeves for insulated and noninsulated piping in lieu of sealing sleeves as outlined above. Shields shall be installed in strict accordance with manufacturer's recommendations.

**END OF SECTION 22 0700**

**SECTION 22 4000  
PLUMBING**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. The work in this specification and the accompanying drawings consists of performing all labor and furnishing of all material and equipment necessary to install complete systems listed below, including minor items obviously necessary for complete and operating systems.
  - 1. Domestic Water Systems
  - 2. Plumbing Fixtures
  - 3. Soil, Waste, Sanitary Drainage, and Vent Piping
- B. The plumbing work shall be installed in strict accordance with all applicable local, state, national plumbing regulations, and authority having jurisdiction.
- C. Also included is the work involved to remove existing associated equipment, remodeling of existing systems, including connections between new and existing systems.

**1.3 SUBMITTALS**

- A. Shop drawings as specified in Section 22 0500 shall include the following:
  - 1. Domestic Water System Piping
  - 2. Sanitary Waste & Vent System Piping
  - 3. Plumbing Fixtures
  - 4. Point of Use Thermostatic Mixing Valves
  - 5. Floor Drains
  - 6. Cleanouts
  - 7. Shock Absorbers

**PART 2 - PRODUCTS**

**2.1 GENERAL**

- A. Before proceeding with this part of the work, the Contractor shall carefully survey the existing conditions, and, if necessary, modify the service installation, in order to avoid unforeseen obstructions such as in the floor ductwork, etc. This Contractor shall include all costs for this work, including saw cutting & patching, permits, etc., in his bid.

**2.2 PLUMBING FIXTURES**

- A. Furnish and install plumbing fixtures where shown on the Drawings. Type, size, and performance shall be as tabulated in the schedule and on the drawings.
- B. Where indicated on the drawings to be a future fixture, this contractor shall provide all waste, vent, and water supplies as indicated on the drawings and according to local code.
- C. Exposed flush, waste, and supply pipes at the fixtures shall be chromium plated brass pipe, iron pipe size. Fittings for brass pipe shall be cast brass, chromium plated.
- D. Install chromium plated wall or floor plates (escutcheons) with set-screw where piping passes through walls or floors.
- E. All handicap laboratories supply pipe and drain pipe will be fitted with removable safety covers that comply with handicap code requirements.
- F. All fixtures fitted to the walls or floors shall be ground and true and be sealed with a non-hardening white silicone caulk bead.
- G. All plumbing fixtures shall be supported per manufacturer's recommendations.

### **2.3 POINT OF USE THERMOSTATIC MIXING VALVES**

- A. Furnish and install point of use thermostatic mixing valves where shown on the Drawings. Type, size, and performance shall be as tabulated in the schedule and on the drawings.
- B. The point of use master controller valve shall be a nickel plated thermostatic mixing valve. The mixing valve shall have a spindle to adjust outlet temperature. The mixing valve shall have internal checks and be ASSE 1069 & 1070 approved. Mixing valve to be certified lead free for potable water application.

### **2.4 FLOOR DRAINS**

- A. Furnish and install floor drains where shown on the Drawings. Type, size, and performance shall be as tabulated in the schedule and on the drawings. Connect outlet of drain to "P" trap. Venting installation requirements of floor drains whether or not shown on plans shall be according to code and approved by the code official.
- B. Furnish and install any floor drains required by the authority having jurisdiction to meet the Uniform Plumbing Code 2009 704.3.

### **2.5 CLEANOUTS**

- A. Furnish and install clean outs where shown on the Drawings. Type, size, and performance shall be as tabulated in the schedule and on the drawings. Install proper traffic rating and floor pattern shape for intended use.
- B. Cleanouts shall be provided at the base of all vertical stacks with the cleanout plug located approximately 12" above the floor and extended to wall access cover. Cleanouts in floors on grade shall be located as shown on plans and at changes in direction of pipe run and shall consist of Y fittings and eighth bends. **CLEANOUTS MUST BE PROVIDED IN ACCORDANCE WITH THE LOCAL CODE AND AS SHOWN ON THE DRAWINGS.**
- C. Floor cleanouts – frame and cover threaded for 2" vertical adjustment, threads protected with shield to be removed when concrete is set. Covers-nickel bronze round frame and cover, deep flange tractor type. Extra heavy type in heavy traffic areas, and with carpet cleanout marker for carpeted floors.
- D. Wall Cleanouts – access covers shall be stainless steel.

### **2.6 SHOCK ABSORBERS**

- A. Piping shall be installed with proper safeguards to prevent water hammer. This will be done by installing a sufficient number of serviceable shock absorbers. Shock absorbers shall be Watts or equal.

### **2.7 MISCELLANEOUS CONNECTIONS**

- A. Make all domestic water, waste, vent, gas, air, etc., connections to all equipment in this building whether or not such equipment is furnished under this section or under other sections of the specification. This includes furnishing piping, traps (if required) and shut-off valves on branches to and from each piece of equipment from mains or branch mains.
- B. Make all plumbing connections to existing piping and to all equipment shown on the plans as requiring same. If specific piping details are not shown, the equipment shall be roughed in for and connected in accordance with the manufacturer's recommendations. It will be this contractor's responsibility to obtain shop drawings from whomever furnishes the equipment.

### **2.8 TESTING/CLEANING**

- A. The mechanical contractor is responsible for the testing & cleaning of each respective system in accordance with applicable state and local codes. Tests shall be repeated until each system is proven acceptable.

**END OF SECTION 22 4000**

**SECTION 23 0500  
GENERAL HVAC REQUIREMENTS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. The mechanical contractor shall perform all work and furnish all materials as indicated in the mechanical plans and specifications as necessary for the successful completion of this project.

**1.3 PERMITS AND SERVICES**

- A. The mechanical contractor shall obtain all permits and arrange all inspections, give notices and pay all fees as required by the Authority Having Jurisdiction.
- B. This contractor shall coordinate any necessary site utilities including water, gas, and sewer work with local utility, owner, and other contractors to minimize disruption and downtime. ANY AND ALL CHARGES ASSESSED BY THE CITY OR THE UTILITY TO ACCOMMODATE THE REQUIREMENTS OF THIS PROJECT ARE THE SOLE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR. VERIFY ALL CHARGES AND COORDINATE ALL EQUIPMENT NECESSARY WITH THE UTILITY BEFORE SUBMITTING BID.

**1.4 DRAWINGS AND MEASUREMENTS**

- A. Verify all dimensions and conditions with Architectural and Structural drawings. The small scale of the drawings prohibits the indication of all offsets, fittings and accessories necessary and shall be furnished by this Contractor and required for complete and proper operation.
- B. "Existing Conditions" shown on drawings are based on existing plans and limited field investigation. The field survey was conducted to verify, as much as possible, the accuracy of the locations shown. The Contractor shall verify the accuracy of the "Existing Conditions" as shown on the drawings. As the demolition work progresses perform modifications and additions as necessary to correct for these hidden conditions and allow for the completion of the new work.
- C. The general arrangement of the mechanical systems shall be as shown on the drawings. Field changes shall have the written acceptance of the Engineer.
- D. Consult the drawings and specifications of all other trades. Layout work and coordinate with other trades, before installing any equipment, to avoid interfering with these trades or conflicting with applicable codes.
- E. The mechanical contractor shall bear full responsibility for coordinating his work with other trades to avoid conflicts in space requirements, clearances, etc. Problems arising due to lack of coordination will be the responsibility of the mechanical contractor to resolve. Extra work and/or equipment as a result of not coordinating work shall be the responsibility of the installing contractor and at no cost to the Owner.

**1.5 INSPECTION OF SITE AND DOCUMENTS**

- A. Before submitting a proposal on the work contemplated, the bidder shall thoroughly familiarize himself with the contract documents, the site, and all existing conditions and limitations that may affect the performance of his work. Any conflict noted shall be brought to the attention of the Engineer before bidding. If there is not sufficient time prior to bidding, the Contractor shall bid the larger quantity or better quality of work.
- B. No extra compensation will be allowed, because of misunderstanding the amount of work involved or the bidder's lack of knowledge, for obvious conflicts which could have been discovered or reasonably anticipated prior to bidding.

## 1.6 REGULATIONS AND CODES

- A. All work, materials, and equipment in this contract shall comply with all applicable local, city, state and federal ordinances, regulations, and codes.

## 1.7 INSTRUCTIONS

- A. Furnish verbal and engineer approved written instructions to Owner on all systems. Instruction shall include operating procedures, adjustments, and periodic maintenance. Furnish a copy of the written instructions and attach a letter to the Engineer, prior to final inspection, signed by Owner, attesting to date and satisfaction of instructions.

## 1.1 OPERATING AND MAINTENANCE MANUALS (3 Hard Copies & 1 Electronic Submittal via Submittal Exchange)

- A. PRIOR TO FINAL INSPECTION, The mechanical contractor shall furnish (3) hard copies (including 1 USB Drive) and (1) electronic submittal via Submittal Exchange to the Engineer, containing all pertinent data to the mechanical systems. Information shall be indexed and labeled per system and shall include catalog cuts, installation manuals, maintenance manuals, manufacturer's names, replacement parts list. Include balancing reports as specified. Include written instructions and warranty info as specified.
- B. The first section shall be indexed/labeled "WRITTEN INSTRUCTIONS & TRAINING" noting written instructions with company service contact info and shall include a list of filters for each unit. Also include document with owners signature attesting to date and satisfaction of training.
- C. The second section shall be indexed/labeled "WARRANTY INFO" and shall include a statement of guarantee on the contractors company letter head and shall include warranty statements of all equipment provided/installed under his contract with specific dates. This will note any longer/special warranties.

## 1.2 AS-CONSTRUCTED DRAWINGS (Red Lined on Plans & USB Drives containing scanned PDF)

- A. During construction, each trade shall keep track of the major changes in the rerouting of piping and equipment and shall note these in red on one set of drawings. This set of drawings shall be submitted with the Operation and Maintenance Manuals along with USB drives containing a single PDF file with these same red line plans in electronic form. Most printing shops will be able to scan your trade's large plan sheets into electronic form. Contact the engineer's office if there are any questions.

## 1.3 WORKMANSHIP

- A. Qualified individuals that are properly licensed to perform the work involved shall perform all mechanical work.

## 1.4 CUTTING AND PATCHING

- A. This Contractor shall be responsible for all cutting and patching of holes required for passage of piping, equipment, and ducts. This also applies to the removal or installation of new equipment.
- B. All cutting of existing construction required to install or join new work, except where otherwise indicated on the plans, shall be the responsibility of this Contractor and coordinated with the Construction Manager. Before making any cuts, verify exact locations and sizes with the Construction Manager to confirm that no structural members will be cut. Contractor shall make every effort to minimize extent of cutting existing construction.
- C. The mechanical contractor shall be responsible for patching any openings left in floors, walls, and ceilings that were caused by his/her actions. Patching shall match existing surface in color, texture and quality so that patch is indistinguishable from original surface.

## 1.5 PAINTING

- A. Any equipment which becomes rusted or damaged during construction shall be repaired, cleaned, and repainted by this Contractor. Painting shall always be applied in two coats, one primer and one finish.

## **1.6 EQUIPMENT AND PIPE SUPPORTS**

- A. Provide all structural supporting frames, steel stands, concrete bases, and hangers as required for mechanical equipment. All floor equipment shall be set on 4" high concrete bases furnished by this Contractor, unless otherwise noted.
- B. Paint all unprotected metal, except galvanized and copper, with metal protective paint.
- C. Hangers for piping shall be large enough to encompass insulation.
- D. All piping support must be installed such that it does not compromise the vapor seal of the insulation.
- E. Provide saddles at all hangers or supports of insulated piping. Saddles for 4" and larger piping shall be fabricated of 14 gauge galvanized iron, and for smaller piping shall be fabricated of 16 gauge galvanized iron. Saddles shall be one-half the circumference of the pipe insulation and 4" shorter than the insulation inserts.
- F. Under no condition shall any pipe or duct structure be used to support another.

## **1.7 ACCESS TO EQUIPMENT**

- A. Access shall be provided to all motors, valves, dampers, controls, specialties, etc., for maintenance purposes. All access doors, access panels, removable sections, etc., required for access shall be provided. The location of the access openings relative to the mechanical equipment shall be coordinated to assure proper access to the equipment.
- B. Access openings are required for manual, motorized, fire, and smoke dampers and other devices requiring access and shall be provided in the ductwork, plenums, housings, tanks, etc., under this portion of the contract.

## **1.8 EXCAVATING AND BACKFILLING**

- A. None.

## **1.9 TESTING AND ADJUSTING**

- A. At the completion of work, all parts of the installation under Division 23 shall be cleaned, lubricated, tested, and adjusted for proper operation.
- B. All piping and ductwork shall be tested and cleaned as required, by all local, state and federal codes. Tests shall be performed in the presence of the authority having jurisdiction. Written notification of test, date, and results shall be furnished to the Engineer before concealing or covering the installation.
- C. All controls shall be tested and adjusted for proper operation. Adjustments shall be made when all systems are operating which may affect the control system.
- D. An Independent Testing & Balancing Agent shall test and balance all mechanical systems as specified in Section 23 0593.

## **1.10 GUARANTEE**

- A. Warranty: The mechanical contractor shall warrant his work against failure and workmanship for a period of at least one year from the date of substantial completion, for all new work. Any work that is defective within that one-year period shall be replaced by the Contractor without charge. If longer/special warranties are noted elsewhere in the specifications, those warranties shall apply.

## **1.11 EQUIPMENT IDENTIFICATION**

- A. Major mechanical equipment, rooftop units, energy recovery ventilators, electric duct heaters, heat pumps, exhaust fans, etc. shall be provided with identification as designated on the plans. Labels shall be black laminate three-layer plastic with engraved 1/2 inch white letters, adhered, screwed, or riveted to the equipment. Manufactured by Brady, Champion America/Seton.
- B. Piping shall be identified as to contents and flow direction with plastic, color coded, snap-on or adhesive labels. Manufactured by Brady, Champion America/Seton.
  - 1. Labeling shall be located:
    - a. Adjacent to each valve.



- b. At each side of and at each obstruction.
  - c. At each branch.
  - d. At each cap for future.
  - e. At each takeoff.
  - f. At each side of penetration of structure or enclosure.
  - g. At each equipment connection.
  - h. At all access doors.
  - i. A maximum of every 40 feet on straight runs of piping including rises and drops.
  - j. Minimum one label per room/space.
- C. Valve tags shall be brass with stamped letters, tag size 1-1/2" minimum in diameter.
- 1. Provide typed valve lists in each O&M binder. Valve lists shall include the valve number, location, and purpose of each valve, and any other necessary information such as the required opening or closing of another valve when one valve is to be opened or closed.
- D. Color coded indicators shall be installed on the ceiling grid or access door to hard lid areas to indicate all valves and other ceiling mounted equipment requiring service (example – VAV's). Each trade shall be responsible for equipment provided under their respectable trade.
- 1. Each ceiling label shall be color coded laminated engraved plastic, 1/16" thick, 2.5" wide by 0.75" tall, with white lettering centered on each label. Label to be adhered to the acoustic ceiling tile grid. Seton Style AV0175 or similar.

#### **1.12 MECHANICAL SUBMITTAL**

- A. All equipment shall be as listed on the equipment schedules or approved equal.
- B. Prior Approval: Manufacturers whose product is not specified or specifically listed on the plans or in the specifications are allowed to submit information on a product that they would like to be considered as an equal to those specified or listed. By submitting this information for consideration, the product representative is indicating that the product being presented for consideration equals or exceeds the specified product in quality, performance and operating parameters. Proof of equality rests with the party making the request. The procedure for this submittal is listed below.
- C. Submit literature on product that is to be considered for prior approval. This literature shall include catalog cuts with all pertinent technical specifications, dimensions and pictures of the product.
- D. Final approval of all equipment shall be contingent on shop drawing acceptance, compliance with the specifications and performance criteria as required. General approval to bid a product does not relieve the supplier or contractor of meeting specific specification requirements.
- E. The Mechanical Contractor shall pay, provide, install and be responsible for any extra materials required due to his use of alternate accepted equipment which has installation requirements different than the specified equipment. This includes paying other trades for any extra work they are involved in due to this substitution of equipment.
- F. Literature shall be submitted so that the engineer receives it no later than 7 days prior to bid date.
- G. All approvals will be in the form of an addendum issued to all plan holders.
- H. List of Acceptable Substitutions:
  - 1. Registers, Grilles, & Diffusers: Metalaire, E.H. Price, Tuttle & Bailey, Titus, Krueger, Nailor, Hart & Cooley, Anemostat, Nailor, J & J Register, Air Specialties Express/Carnes, Greenheck
  - 2. Needlepoint Bipolar Ionization: GPS, Mfg subject to engineer's prior approval (must submit technical submittal minimum 7 days prior to bid opening)
  - 3. In Space Disinfectant Generators: CASPR, Mfg subject to engineer's prior approval (must submit technical submittal minimum 7 days prior to bid opening)
  - 4. Temperature Controls: Siemens by G&R Controls (no substitutions, match existing)

### 1.13 SHOP DRAWINGS

- A. Before ordering any item, Contractor shall review, stamp with his approval and submit shop drawings of equipment as to be furnished under this contract.
  - 1. Electronic submittals are REQUIRED. Electronic submittals can be one combined PDF file for each of the following mechanical trades: Fire Sprinkler, Plumbing, HVAC, & Temperature Controls.
- B. Where the contractor is submitting shop drawings that differ from the plans and specifications, the contractor must notify the engineer in writing each variance from the plans and specifications and the Mechanical Contractor shall pay, provide, install and be responsible for any extra materials required due to his use of alternate accepted equipment which has installation requirements different than the specified equipment. This includes paying other trades for any extra work they are involved in due to this substitution of equipment.
- C. Product Data shall include, but are not limited to, the following: Manufacturer's product specifications, Manufacturer's installation instructions, standard color charts, catalog cuts, roughing-in diagrams and templates, and standard wiring diagrams.

### 1.14 TEMPORARY HEAT

- A. NA.

### 1.15 EXECUTION

- A. Remove equipment as indicated. Demolition work shall be coordinated with the Owner. Should questions arise regarding the removal of equipment, confer with the owner before such equipment is demolished.
- B. Materials removed by demolition shall remain the property of the Owner unless specifically noted. Material the Owner does not wish to retain shall be removed and properly disposed of by the Contractor.
- C. The existing building will be in use during this construction. Schedule and carry out the work in such a manner as to cause the Owner a minimum of inconvenience due to service interruptions. At no additional costs, temporary services shall be installed if one area or phase of construction disrupts service to another area of the building or if equipment has to be relocated to allow construction to progress. Service interruptions shall be confined to the smallest area possible at any one time and interruptions shall be scheduled with the Owners site representative. After service has been restored following an interruption, inspect areas affected by the interruption and be responsible for returning automatically controlled equipment to the same operating condition that existed prior to the interruption.
- D. Install equipment and materials to provide required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing.
- E. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
- F. Coordinate mechanical equipment and materials installation with other building components. Verify all dimensions by field measurements. Arrange for chases, slots, and openings in other building components to allow for mechanical installations.
- G. Final locations of equipment may differ slightly from those shown on these plans. Coordinate exact location of equipment with equipment supplier, structural members, furniture layout and other trades before rough in and adjust accordingly. Pricing shall allow for a minimum of 10 ft. of difference in the actual location of items as compared to the location shown on the drawings.
- H. All penetrations for piping, ductwork, etc. which penetrate floors, fire and/or smoke walls, roofs, full height partitions and similar structures shall be sealed by the mechanical contractor with a UL system specifically approved for the application. This system must maintain the required fire rating.

- I. All mechanical systems shall be tested and cleaned as required by Authority Having Jurisdiction.
- J. The mechanical contractor shall have the full responsibility of ensuring that his/her work is performed in a safe manner and shall bear all liability associated with his/her job site safety.
- K. Upon completion of the work, the Contractor shall notify the A/E and make arrangements for a final inspection. Contactor shall provide A/E with copy of all required balance reports prior to the final inspection.
- L. After the final inspection is made, the Contractor will receive a list of items requiring adjustment, correction, replacement, or completion.
- M. The Contractor shall comply completely with all listed requirements within (40) days of receipt of list. Should the Contractor fail to perform within this time limit, the A/E and/or Owner reserves the right to have the work completed by others and the cost deducted from the contract price.

**END OF SECTION 23 0500**

**SECTION 23 0510**  
**BASIC HVAC MATERIALS AND METHODS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This section includes the following basic mechanical materials and methods to complement other Division 23 Sections.
  - 1. Piping materials and installation instructions common to most piping systems.
  - 2. Dielectric fittings.
  - 3. Mechanical sleeve seals.
  - 4. Sleeves.
  - 5. Escutcheons.
  - 6. Grout.
  - 7. Mechanical Demolition.
  - 8. Installation requirements common to equipment specification sections.

**1.3 DEFINITIONS**

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

**1.4 QUALITY ASSURANCE**

- A. All piping shall be specified in this section. Material and installation shall also be subject to state, local codes and ordinances of the area encompassing this project.
- B. Welder's Qualifications: All welder shall be qualified in accordance with ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
- C. Potable-water piping and components shall comply with NSF 14 and NSF 61 Annex G. Plastic piping components shall be marked with "NSF-pw."
- D. Plastic vent piping is not allowed above any ceiling in a return air plenum.
- E. Electrical Characteristics for Mechanical Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

**PART 2 - PRODUCTS**

**2.1 PIPE, TUBE, AND FITTINGS**

- A. Provide piping and factory fabricated fittings as indicated for each service and pipe size. Fitting sizes and types shall match piping or equipment connections. Where not indicated, comply with governing regulations or manufacturer's recommendations.

## 2.2 SLEEVES

- A. The following materials are for wall, floor, slab, and roof penetrations:
  - 1. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
  - 2. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
  - 3. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
  - 4. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

## 2.3 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Cast-Brass Type: With set screw.
  - 1. Finish: Polished chrome-plated.
- C. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
  - 1. Finish: Polished chrome-plated.

## 2.4 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
  - 1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
  - 2. Design Mix: 5000-psi, 28-day compressive strength.
  - 3. Packaging: Premixed and factory packaged.

## PART 3 - EXECUTION

### 3.1 MECHANICAL DEMOLITION

- A. Refer to Division 1 Sections "Cutting and Patching" and "Selective Demolition" for general demolition requirements and procedures.
- B. Disconnect, demolish, and remove mechanical systems, equipment, and components indicated to be removed.
  - 1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
  - 2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
  - 3. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
  - 4. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
  - 5. Equipment to Be Removed: Disconnect and cap services and remove equipment.
  - 6. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
  - 7. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
- C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

### 3.2 HVAC SYSTEMS - COMMON REQUIREMENTS

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

- B. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- C. Do not run piping through electrical or electronic equipment spaces and enclosures unless unavoidable. Install drip pan under piping that must be run through electrical spaces, if approved by local authority.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping to permit valve servicing.
- G. Install piping to allow maximum possible headroom unless specific mounting heights or slopes are indicated.
- H. Install piping at indicated slopes, or level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- I. Install piping free of sags and bends.
- J. Install fittings for changes in direction and branch connections.
- K. Install piping to allow application of insulation.
- L. Select system components with pressure rating equal to or greater than system operating pressure.
- M. Install escutcheons for penetrations of walls, ceilings, and floors.
- N. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
- O. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials conforming to the 25/50 flame spread and smoke developed rating.
- P. Verify final equipment locations for roughing-in.
- Q. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

### **3.3 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS**

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

**END OF SECTION 23 0510**

**SECTION 23 0593  
TESTING, ADJUSTING, AND BALANCING (AIR & WATER)**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes 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. Verifying that automatic control devices are functioning properly.
  - 4. Reporting results of activities and procedures specified in this Section.

**B. Also include all balancing of existing equipment and systems where indicated on the plans.**

**1.3 DEFINITIONS**

- A. AABC: Associated Air Balance Council.
- B. AMCA: Air Movement and Control Association.
- C. NEBB: National Environmental Balancing Bureau.
- D. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.

**1.4 SUBMITTALS**

- A. Certified Testing, Adjusting, and Balancing Reports: Prepared on approved forms certified by the testing, adjusting, and balancing Agent.

**1.5 QUALITY ASSURANCE**

- A. Agent Qualifications: Engage a testing, adjusting, and balancing agent certified by AABC or NEBB or Engineer's approved equal.
- B. Certification of Testing, Adjusting, and Balancing Reports: Certify testing, adjusting, and balancing field data reports. This certification includes the following:
  - 1. Review field data reports to validate accuracy of data and to prepare certified testing, adjusting, and balancing reports.
  - 2. Certify that testing, adjusting, and balancing team complied with approved testing, adjusting, and balancing plan and procedures specified and referenced in this Specification.
- C. Testing, Adjusting, and Balancing Reports: Use standard forms approved by the Engineer.
- D. Instrumentation Type, Quantity, and Accuracy: As described in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems," Section II, "Required Instrumentation for NEBB Certification."
- E. Instrumentation Calibration: Calibrate instruments at least every six months or more frequently if required by the instrument manufacturer.

**1.6 PROJECT CONDITIONS**

- A. Partial Owner Occupancy: The Owner may occupy completed areas of the building before Substantial Completion. Cooperate with the Owner during testing, adjusting, and balancing operations to minimize conflicts with the Owner's operations.

**1.7 COORDINATION**

- A. Coordinate efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist testing, adjusting, and balancing activities.
- B. Provide 7 day's advance notice for each test including scheduled test dates and times.
- C. Perform testing, adjusting, and balancing after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

**PART 2 - PRODUCTS (Not Applicable)**

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine approved submittal data of HVAC systems and equipment.

- B. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Specification Sections have been performed.
- C. Examine system and equipment test reports.
- D. Examine HVAC system and equipment installations to verify that indicated balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are properly installed, and their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- E. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.
- F. Examine air-handling equipment to ensure clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- G. Examine strainers for clean screens and proper perforations.
- H. Examine hydronic equipment for correct piping connections and for clean and straight fins.
- I. Examine equipment for installation and for properly operating safety interlocks and controls.
- J. Examine automatic temperature system components to verify the following:
  - 1. Dampers, valves, and other controlled devices operate by the intended controller.
  - 2. Verify dampers and valves are in the position indicated by the controller.
  - 3. Integrity of valves and dampers for free and full operation and for tightness of fully closed and fully open positions. This includes dampers in multizone units, mixing boxes, and variable-air-volume terminals.
  - 4. Automatic modulating and shutoff valves, including two-way valves and three-way mixing and diverting valves, are properly connected.
  - 5. Sensors are located to sense only intended conditions.
  - 6. Sequence of operation for control modes is according to the Contract Documents.
  - 7. Controller set points are set at design values. Observe and record system reactions to changes in conditions. Record default set points if different from design values.
  - 8. Interlocked systems are operating.
- K. Report to the Engineer deficiencies discovered before and during performance of testing, adjusting, and balancing procedures.

### **3.2 TESTING AND BALANCING PROCEDURES**

- A. Perform testing and balancing procedures on each system according to procedures contained in AABC national standards.
- B. Perform testing and balancing procedures on each system according to procedures contained in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."
- C. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to the insulation Specifications for this Project.
- D. Mark equipment settings with paint or other suitable, permanent identification material, including damper-control positions, valve indicators, fan-speed-control levers, and similar controls and devices, to show final settings.

### **3.3 TOLERANCES**

- A. Set HVAC system airflow and water flow rates within the following tolerances:
  - 1. Supply, Return, and Exhaust Fans: Plus 10 to minus 10 percent.
  - 2. Air Outlets and Inlets: Plus 10 to minus 10 percent.
  - 3. Hydronic & Domestic Water Flow Rate: Plus 10 to minus 10 percent.

### **3.4 REPORTS**

- A. Status Reports: As Work progresses, prepare reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.



- B. Final Report: Typewritten, or computer printout in letter-quality font, on standard bond paper, bound in three-ring, loose-leaf binder, and tabulated and divided into sections by tested and balanced systems.
  - 1. Include a certification sheet in front of binder signed and sealed by the certified testing and balancing agent.
  - 2. Include a list of instruments used for procedures, along with proof of calibration.
  - 3. Final Report Contents: In addition to certified field report data, include the following:
    - a. Pump curves.
    - b. Fan curves.
    - c. Manufacturers' test data.
    - d. Field quality-control test reports prepared by system and equipment installers.
    - e. Other information relative to equipment performance, but do not include approved Shop Drawings and Product Data.
  - 4. General Report Data: In addition to form titles and entries, include the following data in the final report, as applicable:
    - a. Title page.
    - b. Name and address of testing, adjusting, and balancing Agent.
    - c. Project name.
    - d. Project location.
    - e. Architect's name and address.
    - f. Engineer's name and address.
    - g. Contractor's name and address.
    - h. Report date.
    - i. Signature of testing, adjusting, and balancing Agent who certifies the report.

**3.5 ADDITIONAL TESTS**

- A. Within 90 days of completing testing, adjusting, and balancing, perform additional testing and balancing to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. Seasonal Periods: If initial testing, adjusting, and balancing procedures were not performed during near-peak summer and winter conditions, perform additional inspections, testing, and adjusting during near-peak summer and winter conditions.

**END OF SECTION 23 0593**

**SECTION 23 0700  
HVAC SYSTEMS INSULATION**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. The work in this section of the specification and the accompanying drawings consists of performing all labor, equipment, accessories, and materials and in performing all operations necessary for the installation of all insulation for the duct systems and sealing of sleeves.
- B. Work to be insulated includes the following:
  - 1. All return air, transfer air, ducts.
  - 2. Supply air ductwork where applies.
  - 3. All circulating above ground hot water heat piping, valves, and fittings.
  - 4. All sleeves.
- C. All insulation work shall be installed in a workmanlike manner by skilled workmen engaged in this type of work.
- D. Fire-Test-Response Characteristics: Provide products with flame-spread and smoke-developed indices of 25 and 50, respectively, according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction.

**1.3 SUBMITTALS**

- A. Shop drawings/product data as specified in Section 23 0500 shall include the following:
  - 1. Product Data: Identify thermal conductivity, thickness, and jackets (both factory installed and field applied, if any), for each type of product indicated.

**1.4 COORDINATION**

- A. Coordinate clearance requirements with duct Installer for insulation application.
- B. Coordinate clearance requirements with piping Installer for insulation application.
- C. Coordinate size and location of supports, hangers, and insulation shields.
  - 1. All hangers and insulation shields for piping shall be large enough to encompass insulation without penetrating vapor barrier.
  - 2. It shall not be acceptable for insulation to envelope hangers/saddles.
  - 3. It shall not be acceptable for insulation to terminate on either side of hangers not properly sized to encompass insulation.

**PART 2 - PRODUCTS**

**2.1 DUCTWORK INSULATION**

- A. RIGID BOARD DUCT INSULATION
  - 1. Rigid Board shall be fiberglass, CertainTeed type IB with FSK reinforced foil scrim-kraft jacket or accepted equal. Board density shall be 3 lb/cubic foot with thermal conductivity of .23 at 75 degrees F mean temperature. ASTM C 612, Class 1.
- B. FLEXIBLE DUCT INSULATION
  - 1. Flexible insulation shall be fiberglass, CertainTeed standard duct wrap with FSK reinforced foil scrim-kraft jacket or accepted equal. Flexible insulation density shall be 1-1/2 lb/cubic foot with thermal conductivity of .24 at 75 degrees F mean temperature. ASTM C 553, Type I, Class B-4.
- C. DUCTWORK INSULATION ACCESSORIES
  - 1. Provide staples, bands, wires, tape, anchors, comer angles and similar accessories as recommended by insulation manufacturer for applications indicated.
- D. DUCTWORK INSULATION COMPOUNDS

1. Provide cements, adhesives, coatings, sealers, protective finishes and similar compounds as recommended by insulation manufacturer for applications indicated.
- E. INSULATION THICKNESS FOR DUCTWORK: All ducts are to be insulated unless otherwise noted. Insulation thickness and type shall be as follows:
  1. Round Supply duct insulation shall be uninsulated paintgrip ductwork unless otherwise noted.
    - a. All supply air ductwork routed above all ceilings shall be exterior and 1-1/2" thick. See HVAC plans and architectural reflected ceiling plan. Any supply air ductwork routed in exposed structure areas to be uninsulated and shall be paintgrip sheet metal.
  2. Rectangular Return Duct Insulation shall be interior and 1/2" thick (paintgrip sheet metal)
  3. Transfer Duct Insulation shall be interior and 1/2" thick (paintgrip sheet metal).
  4. Transfer Sleeves Insulation shall be interior and 1/2" thick (paintgrip sheet metal).
  5. Exhaust Air Duct Insulation shall be uninsulated paintgrip ductwork.

## 2.2 CIRCULATING ABOVE GROUND HEATING PIPING INSULATION

- A. All piping in concealed and exposed areas shall be insulated with fiberglass pipe insulation with all service jacket. Jacket shall be factory-applied, and, where specified, with white foil scrim-kraft vapor barrier. Insulation shall be Johns-Manville Micro-Lok 850 HP, or accepted equal.
- B. For pipe sizes to individual terminal units 1" and less – insulation thickness shall be 1/2". For pipe sizes of 1-1/4" thru 2" – insulation thickness shall be 1". For pipe sizes of 2-1/2" and larger – insulation thickness shall be 1-1/2".
- C. Fittings, valves, flanges, etc. shall be insulated with fiberglass blanket, Johns-Manville Microlite or pre-cut mitered sections for elbows, J-M Micro-Lok (1lb/cu. ft. density).
- D. Encase pipe fitting insulation with one piece pre-molded Zeston 2000 PVC fitting covers having flame spread index of 25 or less, and smoke developed index of 50 or less, as tested by ASTM E84 (NFPA 255) method.
- E. Provide sheet metal insulation shields at all hanger locations.
- F. **Hangers for piping shall be large enough to encompass insulation. It shall not be acceptable for insulation to envelope hangers/saddles, or for insulation to stop on either side of hangers.**

## PART 3 - EXECUTION

### 3.1 GENERAL APPLICATION

- A. All insulation shall be applied on clean, dry surfaces. All joints shall be snugly butted against the adjoining piece and all joints, seams, voids, flat spots, etc., shall be filled with insulation cement. Do not use cut pieces or scraps abutting each other.
- B. Where double layers are installed, the first layer shall be fastened with binding wire. All joints shall be staggered between the two layers.
- C. Insulation on all cold surfaces must be applied in a continuous, unbroken vapor seal. Hangers, supports, anchors, etc., that are secured directly to cold surfaces must be adequately insulated and vapor sealed to prevent condensation.
- D. All surface finishes shall be extended to protect all surfaces, ends, and raw edges of insulation.
- E. All insulation materials shall be installed in strict accordance with manufacturer's instructions, using recommended adhesives, mastics and coatings applied at specific coverage per gallon and temperature conditions.
- F. Extend insulation without interruption through walls, floors and similar penetrations, except where otherwise indicated.
- G. Maintain integrity of vapor-barrier jackets on insulation, and protect to prevent puncture or other damage.
- H. Do not apply insulation to equipment, breechings, or stacks while hot.

- I. Do not insulate boiler manholes, handholes, cleanouts, ASME stamp, and manufacturer's nameplate. Provide neatly beveled edge at interruptions of insulation.
- J. Provide removable insulation sections to cover parts of equipment, which must be opened periodically for maintenance; include metal vessel covers, fasteners, flanges, frames and accessories.
- K. Repair damaged sections of existing mechanical insulation, both previously damaged or damaged during this construction period. Use insulation of same thickness as existing insulation, install new jacket lapping and sealed over existing.
- L. Insulation installer shall advise Contractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration.

### **3.2 DUCT APPLICATION**

- A. Rigid Insulation shall be secured to duct or sheet metal work by impaling over pin anchors space no more than 12" centers and secured with washers and clips. Pins shall be spot welded to the duct surface by a welding procedure which will not distort the sheet metal or burn through or mar interior finish of the duct plenums of casings but which develop full strength of the pin. Pin sizes and diameters shall be as recommended by manufacturer for type and thickness of insulation specified. Insulation on the underside of all horizontal or sloping ducts shall be additionally secured with 3M Insulation Adhesive 35.
- B. Insulation shall be applied with all joints tightly butted and all points of impalement shall be pointed up and sealed with approved mastic before positioning clips. Where vapor barrier is specified, all joints, breaks, punctures and voids shall be filled with vapor barrier coating compound and covered with vapor seal material identical to the surrounding material.
- C. All joints, duct attachments, and junctions (including those caused by ducts entering walls, projections such as hanger, etc.) shall be pointed and sealed with approved mastic and taped. Where no further finish is required over the vapor barrier, taping shall be carefully done to obtain a neat finished appearance.
- D. Flexible Insulation shall be adhered to duct with fire-retardant adhesive in sufficient quantities to prevent sagging. Ducts with a width over 30" shall be further secured on the underside with mechanical fasteners on 12" maximum centers. Insulation shall be butted with facing overlapping all joints at least 2" and sealed with fire-retardant vapor barrier adhesive. Seal all breaks and punctures with vapor barrier tape and same type of fire retardant adhesive.

### **3.3 SEALING OF SLEEVES**

- A. All sleeves for pipes, ductwork, etc., furnished under Division 23 of specifications, penetrating floors, fire and/or smoke walls and full height partitions, including chase walls, shall be sealed in accordance with the following:
  - 1. All insulated services shall have the specified insulation terminated on either side of sleeve. Services which require a vapor barrier jacket shall have segment through sleeve insulated with calcium silicate having a minimum thickness same as specified for service. Vapor barrier jacket shall be uninterrupted. Entire void space between inside of sleeve and outside of duct, pipe, and/or calcium silicate insulation shall be packed with fiber insulation, conforming to HHI-521E Type 3 or HHI-558B Form A and having an ASTM fire class E-84 with fiber melt point in excess of 2000 degrees F., to a point 1/8 inch from ends of pipe sleeve. After void is packed with fiber insulation, services which are specified to be insulated shall have a section of insulation installed on each side of sleeve, insulation to be fitted tight to sleeve insulation. Balance of space in sleeve to be filled with nonhardening silicone conforming to TTS-00230 and of type which will allow 50 percent movement in one direction.
  - 2. Contractor is herein given the option to provide Pipe Shield, Inc., fire rated wall and floor sleeves for insulated and noninsulated piping in lieu of sealing sleeves as outlined above. Shields shall be installed in strict accordance with manufacturer's recommendations.

**END OF SECTION 23 0700**

**SECTION 23 0900  
CONTROLS & CONTROL SEQUENCES**

**(THIS TEMPERATURE CONTROL WORK WILL BE THE RESPONSIBILITY OF THE HVAC CONTRACTOR AND SHALL BE AN EXTENSION OF THE EXISTING DDC SYSTEM, & BE BY G&R CONTROLS INC. CONTACT PAUL DOOHEN AT 605-336-3788)**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. THIS TEMPERATURE CONTROL WORK WILL BE THE RESPONSIBILITY OF THE HVAC CONTRACTOR.
- B. ALL TEMPERATURE CONTROLS INSTALLED BY THIS CONTRACTOR SHALL BE FIELD INSTALLED. If there are any discrepancies, contact the engineer's office at least 7 days prior to bidding.
- C. THIS SYSTEM SHALL BE AN EXTENSION OF THE EXISTING DDC CONTROLS. THIS NEW DDC SYSTEM MUST BE FULLY INTEGRATED INTO THE EXISTING DDC SYSTEM FOR COMPLETE OPERATOR ACCESS AND CONTROL THROUGH THE EXISTING COLOR GRAPHIC WORKSTATION. CUSTOM GRAPHICAL DISPLAYS FOR THE PROPOSED FLOOR PLAN & ALL PROPOSED EQUIPMENT SHALL BE GENERATED AT THE EXISTING WORKSTATION.
- D. Exact thermostats or space sensors &/OR PROTECTIVE COVERS to be located in the space shall be SUBMITTED TO & APPROVED BY SICHMELLER ENGINEERING & OWNER. Digital display thermostats with adjustable ranges are to be used in all areas.
- E. This Section includes controls & control sequences for HVAC systems, subsystems, and equipment.
- F. The work in this section of the specification and the accompanying drawings consists of performing all labor and furnishing of all material and equipment necessary to install a complete Automatic Temperature Control System for the heating, ventilating, and air conditioning systems as indicated on drawings and specified herein, including minor items obviously necessary for complete and operating systems. Automatic Temperature Control System shall provide the "Sequence of Operation" as described in this section.
- G. The control system shall consist of all room sensors, floor sensors, thermostats, valves, damper operators and other accessories to fulfill the intent of the specifications. The temperature control system shall be installed by trained mechanics regularly employed by the manufacturer of the temperature control system.
- H. Each microprocessor based digital controller will be able to maintain its programmed memory in a non-volatile state during power failures without the use of batteries. All components and related temperature control components such as sensors, control valves, actuators, thermostats, control panels, etc. shall be manufactured by the same vendor.

**1.3 QUALITY ASSURANCE**

- A. Agent Qualifications: An Independent Engineer Approved Temperature Control Contractor shall provide and install all temperature controls and control sequences as specified in this section.

**1.4 PROJECT CONDITIONS**

- A. Partial Owner Occupancy: The Owner may occupy completed areas of the building before Substantial Completion. Cooperate with the trades and HVAC contractor to minimize conflicts with the Owner's operations.

### **1.5 BALANCING OF SYSTEMS**

- A. The Temperature Controls Contractor shall cooperate and work with the mechanical contractors to properly balance out all mechanical systems to obtain a satisfactory working system.

### **1.6 ADJUSTMENT AND CALIBRATION OF SYSTEMS**

- A. After the system is completely installed, the Temperature Controls Contractor with the presence of the mechanical engineer shall verify the various temperature control cycles as herein specified to the satisfaction of the engineer. The Temperature Controls Contractor shall submit direct to the engineer, a tabulation of all outdoor air, mixed air, discharge air, and all room temperatures for each unit. All thermostats and their thermometers shall be calibrated after installation.

### **1.7 SUBMITTALS**

- A. Shop drawings as specified in Section 230500 shall include the following:
  - 1. All control devices, valves, dampers and auxiliary devices to be used.
  - 2. Written descriptions and diagrams to describe the operational sequences.
  - 3. Room thermostat schedule.

### **1.8 CONTROLLERS & WEB-ACCESSED SYSTEM WITH CUSTOM COLOR GRAPHICS**

- A. Provide BACnet Controllers that are BACnet Testing Laboratory Listed. Network communication protocol used throughout entire DDC system shall be native BACnet Communication certified by the BTL open to Owner and available to other companies for use in making future modifications to DDC system.
- B. Unless otherwise specified, all equipment described below shall be controlled and monitored via a Web-accessed system. The Web-accessed system shall allow for any owner's designated personnel to change schedules and setpoints through a PC user on the Local Area Network or remotely via the Internet. This system shall provide complete custom color graphics and password protection. This system shall allow for remote monitoring, control, and troubleshooting via the Internet.
- C. Custom Graphics of Floor Plan: Display the following data:
  - 1. Equipment Designation/Label.
  - 2. Outside-Air Temperature Indication.
  - 3. Cooling or Heating/Economizer System Mode Indication.
  - 4. Zone temperature indication and setpoints.
  - 5. Alarms (as recommended by T.C.C.).

## **PART 2 - CONTROL SEQUENCES**

### **2.1 EXISTING FAN POWERED VARIABLE AIR VOLUME (VAV's) TERMINAL UNIT CONTROL**

- A. The existing operating sequences for the existing Fan Powered VAV's) shall be maintained and utilized, except for modifications necessary for operations described in this section.
- B. FAN POWERED VAV'S WITH HYDRONIC CONTROLS
  - 1. The fan powered VAV provides variable volume, constant temperature air in the cooling mode, and constant volume, variable temperature air in the heating mode. At the design cooling condition, the primary air valve is handling the maximum scheduled airflow capacity while the unit fan is off. As the cooling load decreases, the primary air valve throttles toward the minimum scheduled airflow capacity. A further decrease in the cooling load causes the unit fan to start, inducing warm air from the ceiling plenum which increases the discharge air temperature to the zone. When the heating load increases, the hot water coil is energized to maintain comfort conditions with modulating hydronic control valve.
  - 2. All VAV Units shall operate in either the occupied or unoccupied mode and the space sensor with adjustable setpoint shall have an over-ride button on the face to return the terminal unit to its occupied mode of operation if the terminal unit is in "Unoccupied" mode.

- C. Operator's Workstation shall display the following:
1. Equipment Designation/Label.
  2. Room/area served.
  3. Room occupied/unoccupied.
  4. Room temperature.
  5. Room temperature set point, occupied.
  6. Room temperature set point, unoccupied.
  7. Actual Air Temperature Delivered to the VAV.
  8. Mode indication, heating/cooling/satisfied.
  9. Entering Hot Water Temperature
  10. 2-way Modulating hot water valve position as percent open.
  11. Air-damper position as percent open
  12. Supply airflow rate, target.
  13. Supply airflow rate, actual.
  14. VAV Discharge Air Temperature.
  15. Alarm Status (Alarms as recommended by T.C.C.).

## 2.2 BY ADD ALTERNATE #1 – NEEDLEPOINT BI-POLAR IONIZATION SYSTEM

- A. By Add Alternate #1, VC to provide & install needlepoint bi-polar ionization systems in all proposed & remaining HVAC systems as noted on the plans, TC to monitor system status and alarm when not operational. VC to provide & install GPS-iMeasure ion detectors where indicated on plans, TC to monitor ion meter.
- B. Graphic Operator's Workstation shall display the following:
1. Equipment Designation Served by Ionization System.
  2. Each Needlepoint Bi-Polar Ionization System Status.
  3. Each Ion Meter Indication (ions/cc).
  4. Alarm Status (alarms as recommended by the T.C.C.).

## 2.3 TRAINING

- A. The Temperature Control Contractor shall provide (4) hours of training to the owner's representative.

## 2.4 WARRANTY

- A. The entire control system shall be warranted for a period of 1 year from the date of beneficial use of the system.

## PART 3 - PRODUCTS

1. N/A.

## PART 4 - EXECUTION

### 4.1 INSTALLATION

- A. All devices in mechanical rooms shall be panel mounted whenever possible. Wiring to remote mounted devices in mechanical rooms and inaccessible spaces shall be run in conduit. Wiring in accessible ceilings may be run with plenum rated cable providing it is securely fastened to the structural members at 4' intervals. In general, all wiring in conjunction with the automatic temperature control system shall be furnished by the Temperature Control Contractor under this section of the specifications in accordance with Division 26 of the specifications.
- B. All automatic valves shall be furnished by the Temperature Control Contractor and installed under his supervision by the Heating Contractor. All automatic dampers, not furnished with the equipment, shall be furnished by the Temperature Control Contractor and installed under his supervision by the Sheet Metal Contractor.
- C. **Room thermostats and remote sensors shall be wall mounted type and shall be mounted to match installation height of adjacent switches/sensors by EC, or where there are no adjacent switches/sensors, 46" on center above finished floor. Coordinate mounting location with EC to locate t-stats/sensors and wall switches. Thermostats and sensors shall not be mounted on outside walls.**

#### **4.2 PROJECT COMPLETION AND ACCEPTANCE**

- A. Upon completion of this project, it will be this Contractors responsibility to insure that the control system is functioning properly. The Contractor shall also insure that the control diagrams for the project are brought up to date and that they reflect the control system "as built". These control diagrams and screen shots of the various screens of the color graphics system shall be included in the Operation and Maintenance Manuals, which shall be turned over to the Owner following the acceptance of the above procedure by the A/E.

**END OF SECTION 23 0900**



**SECTION 23 2113  
HYDRONIC PIPING SYSTEMS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. The work in this specification and the accompanying drawings consists of performing all labor and furnishing of all material and equipment necessary to install complete systems listed below, including minor items obviously necessary for complete and operating systems. Piping materials and equipment specified in this Section include the following:
  - 1. All new heating water hydronic piping systems
  - 2. Pipes, fittings, and specialties.
  - 3. Meters and gages.
  - 4. Hydronic specialties.
- B. See Division 23 Section "Basic HVAC Materials and Methods" for general piping installation requirements.
- C. Also included is the work involved to remove existing associated equipment, remodeling of existing systems, including connections between new and existing systems.

**1.3 SUBMITTALS**

- A. Shop Drawings: Shop drawings as specified in Section 230500 shall include the following:
  - 1. Heating Water Hydronic Pipe, Valves, and Fittings
  - 2. Propylene Glycol – 30% Solution Heating Water System
  - 3. Glycol Solution Analysis & Water-Treatment Program: Independent analysis of proposed heating solution after work is complete to confirm proper glycol % and treatment. If solution analysis is not satisfactory, make adjustments as recommended by glycol supplier.
  - 4. Spare Parts
- B. Product Data: For each type of special-duty valve indicated. Include flow and pressure drop curves based on manufacturer's testing for diverting fittings, calibrated balancing valves, and automatic flow-control valves.
- C. Shop Drawings: Detail fabrication of pipe anchors, hangers, special pipe support assemblies, alignment guides, expansion joints and loops, and their attachment to the building structure.
- D. Detail location of anchors, alignment guides, and expansion joints and loops.
- E. Field quality-control test reports.
- F. Operation and maintenance data.

**1.4 MANUFACTURERS**

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work shall be as specified in Section 23 0510.

**1.5 QUALITY ASSURANCE**

- A. Welding: Qualify processes and operators according to the ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
- B. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.

**1.6 COORDINATION**

- A. Coordinate pipe sleeve installations for foundation wall penetrations.
- B. Coordinate layout and installation of piping with equipment and with other installations.

- C. Coordinate pipe fitting pressure classes with products specified in related Sections.
- D. Coordinate with requirements for firestopping for fire and smoke wall and floor assemblies.

## **PART 2 - PRODUCTS**

### **2.1 PIPES, TUBES, AND FITTINGS**

- A. Copper Tube and Fittings:
  - 1. Drawn-Temper Copper Tubing: ASTM B 88, Type L.
  - 2. Annealed-Temper Copper Tubing: ASTM B 88, Type K.
  - 3. Wrought-Copper Fittings: ASME B16.22.
  - 4. Wrought-Copper Unions: ASME B16.22.
  - 5. Solder Filler Metals: ASTM B 32, 95-5 tin antimony.
  - 6. At the contractor's option, Nibco Press System or Viega may be used on domestic or hydronic water in lieu of soldered copper fittings. Fittings shall be suitable for working pressures to 200 psig CWP and maximum operating temperatures to +230 degrees F. The fitting manufacturer's factory trained representative shall provide on-site training for contractor's field personnel in the use of tools, marking and preparation of pipe, and installation of products. The representative shall periodically visit the job site and review contractor's installation and verify the correct procedures are being followed.
- B. Steel Pipe and Fittings:
  - 1. Steel Pipe, NPS 2 and Smaller: ASTM A 53, Type S (seamless), Grade A, Schedule 40, black steel, plain ends.
  - 2. Steel Pipe, NPS 2-1/2 through NPS 12: ASTM A 53, Type E (electric-resistance welded), Grade A, Schedule 40, black steel, plain ends.
  - 3. Steel Pipe Nipples: ASTM A 733, made of ASTM A 53, Schedule 40, black steel; seamless for NPS 2 and smaller and electric-resistance welded for NPS 2-1/2 and larger.
  - 4. Cast-Iron Threaded Fittings: ASME B16.4; Classes 125 and 250.
  - 5. Malleable-Iron Threaded Fittings: ASME B16.3, Classes 150 and 300.
  - 6. Malleable-Iron Unions: ASME B16.39; Classes 150, 250, and 300.
  - 7. Cast-Iron Pipe Flanges and Flanged Fittings: ASME B16.1, 125, and 250; raised ground face, and bolt holes spot faced.
  - 8. Wrought-Steel Fittings: ASTM A 234 (ASTM A 234M), Standard Weight.
  - 9. Wrought-Steel Flanges and Flanged Fittings: ASME B16.5, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
    - a. Material Group: 1.1.
    - b. End Connections: Butt welding.
    - c. Facings: Raised face.
  - 10. Grooved Mechanical-Joint Fittings: ASTM A 536, Grade 65-45-12 ductile iron; ASTM A 47, Grade 32510 malleable iron; ASTM A 53, Type F, E, or S, Grade B fabricated steel; or ASTM A 106, Grade B steel fittings with grooves or shoulders designed to accept grooved end couplings.
  - 11. Grooved Mechanical-Joint Couplings: Ductile- or malleable-iron housing and synthetic rubber gasket of central cavity pressure-responsive design; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.
  - 12. Spherical, Rubber, Flexible Connectors: Fiber-reinforced rubber body, steel flanges drilled to align with Classes 150 and 300 steel flanges; operating temperatures up to 220 deg. F and pressures up to 150 psig.
  - 13. Gasket Material: Thickness, material, and type suitable for fluid to be handled; and design temperatures and pressures.

## 2.2 VALVES

- A. General-Duty Valves, NPS 2 and Smaller: Bronze body, ball type, threaded ends, unless otherwise indicated. Valve pressure and temperature ratings not less than indicated and as required for system pressures and temperatures. Valve size shall be the same size as upstream pipe, unless otherwise indicated. Quarter-turn lever handle valve actuators. Extended valve stems on insulated valves.
- B. Safety Valves: Diaphragm-operated, bronze or brass body with brass and rubber, wetted, internal working parts; shall suit system pressure and heat capacity and shall comply with the ASME Boiler and Pressure Vessel Code, Section IV.
- C. Pump Discharge Valves: 175-psig maximum working pressure, 250 deg F maximum operating temperature, cast-iron or ductile iron body, replaceable bronze disc with EPDM seat insert, bronze seat, stainless steel stem and spring, and "Teflon" packing. Valves shall have NPT, grooved or flanged connections and straight or angle pattern. Features shall include non-slam check valve with spring-loaded weighted disc, pressure taps, and calibrated adjustment feature to permit regulation of pump discharge flow, shutoff and valve design to permit repacking under full system pressure.

## 2.3 METERS AND GAGES

- A. Liquid-In-Glass Thermometers
  1. Description: ASTM E 1.
  2. Range: Temperature range of 40 to 240 deg F, with 2-degree scale divisions (minus 18 to plus 70 deg C, with 1-degree scale divisions). Accuracy shall be plus or minus 1 percent of range span or plus or minus one scale division to maximum of 1.5 percent of range span.
  3. Case: Die cast and aluminum finished in baked-epoxy enamel, glass front, spring secured, 9 inches long.
  4. Adjustable Joint: Finish to match case, 180-degree adjustment in vertical plane, 360-degree adjustment in horizontal plane, with locking device.
  5. Tube: Red or blue reading, organic-liquid filled with magnifying lens.
  6. Scale: Satin-faced nonreflective aluminum with permanently etched markings.
  7. Stem: Copper-plated steel, aluminum, or brass for separable socket; of length to suit installation.
- B. Bimetal Dial Thermometers
  1. ASME B40.3; direct-mounting, universal-angle dial type.
  2. Case: Stainless steel with 5-inch diameter lens.
  3. Adjustable Joint: Finish to match case, 180-degree adjustment in vertical plane, 360-degree adjustment in horizontal plane, with locking device.
  4. Element: Bimetal coil.
  5. Scale: Satin-faced nonreflective aluminum with permanently etched markings.
  6. Stem: Stainless steel for separable socket, of length to suit installation.
- C. Thermometer Wells
  1. Description: Fitting with protective well for installation in threaded pipe fitting to hold test thermometer.
  2. Material: Brass, for use in copper piping.
  3. Material: Stainless steel, for use in steel piping.
  4. Extension-Neck Length: Nominal thickness of 2 inches, but not less than thickness of insulation. Omit extension neck for wells for piping not insulated.
  5. Insertion Length: To extend 2 inches into pipe.
  6. Cap: Threaded, with chain permanently fastened to socket.
- D. Pressure Gages

1. Description: ASME B40.1, phosphor-bronze bourdon-tube type with bottom connection; dry type, unless liquid-filled-case type is indicated.
  2. Case: Drawn steel, brass, or aluminum with 4 ½" diameter, glass lens.
  3. Connector: Brass, NPS ¼.
  4. Scale: White-coated aluminum with permanently etched markings
  5. Accuracy: Grade A, plus or minimum 1 percent of middle 50 percent of scale.
  6. Range: Comply with the following:
    - a. Fluids under Pressure: Two times the operating pressure.
- E. Pressure Gage Fittings
1. Hydronic Indicator: Brass body with four inlets and valves by Flow Conditioning Corp. (314) 878-7898 or equal.
  2. Valves: NPS ¼ brass or stainless-steel needle type
  3. Syphons: NPS ¼ coil of brass tubing with threaded ends.
  4. Snubbers: ASME B40.5, NPS ¼ brass bushing with corrosion-resistant porous-metal disc of material suitable for system fluid and working pressure.
- F. Test Plugs
1. Description: Nickel-plated, brass –body test plug in NPS ½ fitting.
  2. Body: Length as required to extend beyond insulation.
  3. Pressure Rating: 500 psig minimum.
  4. Core Inserts: Two self-sealing valves, suitable for inserting 1/8-inch OD probe from dial-type thermometer or pressure gage.
  5. Core Material for Air, Water, and Gas: 20 to 200 deg F (Minus 7 to plus 93 deg C), chlorosulfonated polyethylene synthetic rubber.
  6. Test-Plug Cap: Gasketed and threaded cap, with retention chain or strap.
  7. Test Kit: Pressure gage and adapted with probe, two bimetal dial thermometers, and carrying case.
- G. Pressure Gage and Thermometer Ranges: Approximately two times the system's operating conditions.

## 2.4 HYDRONIC SPECIALTIES

- A. Manual Air Vent: Bronze body and nonferrous internal parts; 150-psig working pressure; 225 deg F operating temperature; manually operated 1/2" full port ball valve with gooseneck down; with NPS 1/2 discharge connection and NPS 1/2 inlet connection, and chained cap hose connection.
- B. Automatic Air Vent: Designed to vent automatically with float principle; bronze body and nonferrous internal parts; 150-psig working pressure; 240 deg F operating temperature; with NPS 1/4 discharge connection and NPS 1/2 inlet connection.
- C. Y-Pattern Strainers: 125-psig working pressure; cast-iron body (ASTM A 126, Class B), flanged ends for NPS 2-1/2 and larger, threaded connections for NPS 2 and smaller, bolted cover, perforated stainless-steel basket, and bottom drain connection.
- D. Propylene Glycol: Industrially inhibited propylene glycol-based heat transfer fluid by Interstate Chemical, with Inhibitor and Deionized Water (or prior approved equal), with the following features:
  1. Industrially inhibited propylene glycol (phosphate-based).
  2. Dyed to facilitate leak detection.
  3. Easily analyzed for glycol concentration and inhibitor level.
  4. For systems containing more than 250 gallons of fluid, annual analysis must be provided free of charge by the fluid manufacturer.
  5. Fluid must pass ASTM D1384 (less than 0.5 mils penetration per year for all systems metals).

6. Reserve alkalinity of the fluid must be at least 15 to provide long-term resistance to acidic pH.

## **2.5 FLOW CONTROL AND STRAINER VALVES**

- A. Existing to be salvaged and reinstalled.

## **PART 3 - EXECUTION**

### **3.1 PIPING APPLICATIONS**

- A. Coordinate applications below with materials specified in this Section. Pipe sizes at which joining methods change are between NPS 2 and NPS 2-1/2 (DN 50 and DN 65). Adjust this change point to suit personal preference. Soldered joints for pipes larger than NPS 2 (DN 50) may not meet system pressures.
- B. Hydronic Piping Systems: Type L drawn-temper copper tubing with soldered joints.
- C. Hydronic Piping Systems: Schedule 40 steel pipe with threaded joints and fittings for 2 inch and smaller, and with welded joints and fittings for 2-1/2 inch and larger.
- D. Hydronic Piping Systems: Schedule 40 steel pipe with mechanical couplings.
- E. Hydronic Piping Systems: Type L drawn-temper copper tubing with mechanical couplings.

### **3.2 VALVE APPLICATIONS**

- A. Unless otherwise indicated, use the following general-duty valve types for applications indicated:
  1. Shutoff Duty: Ball, and butterfly valves.
  2. Throttling Duty: Ball, and butterfly valves.
- B. Install shutoff duty valves at each branch connection to supply mains, at supply connection to each piece of equipment, and elsewhere as indicated.
- C. Install throttling duty valves at each branch connection to return mains, at return connections to each piece of equipment, and elsewhere as indicated.
- D. Install calibrated plug or automatic flow control valves on the outlet of each heating or cooling element and elsewhere as indicated to facilitate system balancing.
- E. Install drain valves at low points in mains, risers, branch lines, and elsewhere as required for system drainage.
- F. Install check valves at each pump discharge and elsewhere as required to control flow direction.
- G. Install safety relief valves on hot-water generators and elsewhere as required by the ASME Boiler and Pressure Vessel Code. Install safety-valve discharge piping, without valves, to floor. Comply with the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, for installation requirements.

### **3.3 METER AND GAGE INSTALLATION**

- A. Calibrate and install meters, gages, and accessories according to manufacturer's written instructions for applications where used.
- B. Thermometer Installation
  1. Install thermometers and adjust vertical and tilted positions.
  2. Install in the following locations:
    - a. As shown on piping details of plans.
  3. Install remote-reading dial thermometers in control panels with tubing connecting panel and thermometer bulb supported to prevent kinks. Use minimum tubing length.
  4. Install thermometer wells in vertical position in piping tees where test thermometers are indicated.
    - a. Install with stem extending a minimum of 2 inches into fluid.
    - b. Fill wells with oil or graphite and secure caps.
- C. Pressure Gage Installation

1. Install pressure gages in piping tees with pressure-gage valve located on pipe at most readable position.
  2. Install dry-type pressure gages in the following locations:
    - a. As shown on piping details of plans.
  3. Install liquid-filled-type pressure gages at suction and discharge of each pump.
- D. Install pressure-gage needle valve and snubber in piping to pressure gages.

### **3.4 HYDRONIC PIPING INSTALLATIONS**

- A. Install piping according to Section 23 0510 "Basic Mechanical Materials and Methods."
- B. Locate groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.
- C. Install drains, consisting of a tee fitting, NPS 3/4 ball valve, and short NPS 3/4 threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.
- D. Install piping at a uniform grade of 0.2 percent upward in direction of flow. Install condensate piping at a uniform grade of 1/4 inch per foot downward in direction of flow.
- E. Reduce pipe sizes using eccentric reducer fitting installed with level side up.
- F. Install branch connections to mains using tee fittings in main pipe, with the takeoff coming out the top or side of the main pipe. For up-feed risers, install the takeoff coming out the top of the main pipe.
- G. Install unions in pipes 2-inch NPS (DN50) and smaller, adjacent to each valve, at final connections of each piece of equipment, and elsewhere as indicated. Unions are not required at flanged connections.
- H. Install flanges on valves, apparatus, and equipment having 2-1/2-inch NPS (DN65) and larger connections.
- I. Install flexible connectors at inlet and discharge connections to pumps (except in-line pumps) and other vibration-producing equipment.
- J. Install strainers on supply side of each control valve, pressure-reducing valve, solenoid valve, in-line pump, and elsewhere as indicated. Install NPS 3/4 nipple and ball valve in blowdown connection of strainers NPS 2 and larger.
- K. Anchor piping for proper direction of expansion and contraction.

### **3.5 HANGERS AND SUPPORTS**

- A. Piping support must account for expansion and contraction, vibration, and dead load of piping and its contents, and seismic bracing requirements.
- B. Hanger, support, and anchor devices shall comply with requirements below for maximum spacing of supports. Install the following pipe attachments:
  1. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet long.
  2. Adjustable roller hangers and spring hangers for individual horizontal piping 20 feet or longer.
  3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet or longer, supported on a trapeze.
  4. Spring hangers to support vertical runs.
  5. Install hangers for steel piping with the following maximum spacing and minimum rod sizes:
    - a. NPS 3/4: Maximum span, 7 feet; minimum rod size, 1/4 inch.
    - b. NPS 1: Maximum span, 7 feet; minimum rod size, 1/4 inch.
    - c. NPS 1-1/2: Maximum span, 9 feet; minimum rod size, 3/8 inch.
    - d. NPS 2: Maximum span, 10 feet; minimum rod size, 3/8 inch.
    - e. NPS 2-1/2: Maximum span, 11 feet; minimum rod size, 3/8 inch.
    - f. NPS 3: Maximum span, 12 feet; minimum rod size, 3/8 inch.

6. Install hangers for drawn-temper copper piping with the following maximum spacing and minimum rod sizes:
  - a. NPS 3/4: Maximum span, 5 feet; minimum rod size, 1/4 inch.
  - b. NPS 1: Maximum span, 6 feet; minimum rod size, 1/4 inch.
  - c. NPS 1-1/2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
  - d. NPS 2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
  - e. NPS 2-1/2: Maximum span, 9 feet; minimum rod size, 3/8 inch.
  - f. NPS 3: Maximum span, 10 feet; minimum rod size, 3/8 inch.
7. Support vertical runs at roof, at each floor, and at 10-foot intervals between floors.

### **3.6 PIPE JOINT CONSTRUCTION**

- A. Refer to Division 23 Section "Basic HVAC Materials and Methods" for joint construction requirements for soldered and brazed joints in copper tubing; threaded, welded, and flanged joints in steel piping.
- B. Mechanical Joints: Assemble joints according to fitting manufacturer's written instructions.

### **3.7 HYDRONIC SPECIALTIES INSTALLATION**

- A. Install manual (not automatic) full port ball valve operated air vents at high points in piping, at heat-transfer coils, and elsewhere as required for system air venting. Install ball isolation valves with chained caps.
  1. Heating water system:
    - a. The plumbing contractor shall be responsible for cleaning and flushing the new hydronic system piping prior to pumping in new heating solution/startup.
    - b. After proposed work is complete, the plumbing/hydronics contractor is to provide a complete analysis of the hydronic system to confirm proper glycol % and treatment. Submit analysis/recommendations to Sichmeller engineering & owner. If solution analysis indicates solution is not satisfactory, this contractor to make adjustments as recommended by glycol supplier & retest until analysis is satisfactory.
  2. Install automatic air vents in mechanical equipment rooms only at high points of system piping, at heat-transfer coils, and elsewhere as required for system air venting.

### **3.8 TERMINAL EQUIPMENT CONNECTIONS**

- A. Size for supply and return piping connections shall be same as for equipment connections.
- B. Install control valves in accessible locations close to connected equipment.
- C. Install flow control valves and strainer valves as shown on piping details.

### **3.9 FIELD QUALITY CONTROL**

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.
- B. Prepare hydronic piping and perform testing according to ASME B31.9. Prepare written report of testing.

### **3.10 ADJUSTING AND CLEANING**

- A. Consult with and comply with boiler manufacturer's recommendations.
- B. After completing systems installation, including outlet fittings and devices, inspect finish. Remove burrs, dirt, and construction debris, and repair damaged finishes including chips, scratches, and abrasions.
- C. Flush hydronic piping systems with clean water. Remove and clean or replace strainer screens. After cleaning and flushing hydronic piping systems, but before balancing, remove disposable fine-mesh strainers in pump suction diffusers.
- D. Preparation for testing: Prepare hydronic piping in accordance with ASME B 31.9.
- E. Testing: Test hydronic piping as specified in ASME B 31.9 "Building Services Piping."
- F. System Cleaning:

1. Fill the entire system with clean, fresh water and properly vent. Repair piping leaks as early in this procedure as they are discovered. Inspect existing piping system and notify engineer immediately for any leaks requiring repairs. With valves positioned by bypass the boiler and terminal equipment, start the pump to circulate water through the system. Check strainers at pumps and at terminal equipment (new and existing) frequently and clean as often as needed. If the water is extremely dirty or murky, flush continuously, using the system pump, until the water being flushed out of the pipe loop has become clear. To flush in this manner requires care to be certain that make-up water is being added fast enough to replace what is being flushed out. Accomplish this by opening the make-up water bypass valve around the automatic pressure reducer valve and adjust the manual valve so that the pump suction pressure gauge continues to indicate the same positive pressure that existed before the manual drain and make-up valves were opened. Continue for at least two hours. Once the water is clear and debris flushed out, stop the pump.
2. To complete the cleaning, fill the system with fresh water, adding a cleaning agent such as trisodium phosphate (TSP). Disconnect all power to the terminal units so that they will not operate while the system is being cleaned. Then circulate cleaning solution throughout the system, with boiler controls temporarily adjusted to raise the solution temperature to about 105 deg F to 110 deg F. Do not allow the temperature to rise above 110 deg F. Alternate operation of the primary and standby pumps and circulate the warm solution for several hours. Then turn off the boiler and pump, completely drain the system, and refill with fresh water. Repeat the cleaning process only if there is indication of foreign matter still in the system or if a test of the water indicated that it is slightly acid.
3. Water should be slightly alkaline, with a pH no higher than 8.0 and no lower than 7.0.
4. Add glycol to new Heating hydronic piping system to provide a total of 40% by volume.
- G. Install laminated engraved placard near boilers with 1" engraved letters indicating glycol type & concentration in boiler room.
- H. Mark calibrated nameplates of pump discharge valves after hydronic system balancing has been completed, to permanently indicate final balanced position.
- I. Chemical Treatment: Provide a water analysis prepared by chemical treatment supplier to determine type and level of chemicals required to prevent scale and corrosion. Perform treatment after completing system testing and retest as necessary. If solution analysis is not satisfactory, make adjustments as recommended by glycol supplier and retest as necessary until analysis is satisfactory.

### 3.11 COMMISSIONING

- A. Fill system and perform initial chemical treatment.
- B. Check expansion tanks to determine that they are not air bound and that system is completely full of water.
- C. Perform these adjustments before operating the system:
  1. Open valves to fully open position. Close coil bypass valves.
  2. Check pump for proper direction of rotation.
  3. Set automatic fill valves for required system pressure.
  4. Check air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
  5. Set temperature controls so all coils are calling for full flow.
  6. Check operation of automatic bypass valves.
  7. Check and set operating temperatures of boilers, chillers, to design requirements.
  8. Lubricate motors and bearings.



**3.12 MISCELLANEOUS CONNECTIONS**

- A. Make all hydronic connections. This includes boiler connections, connections of heating coils to equipment supplied and/or mounted under HVAC Section. This includes piping, valves, strainers, air vents, thermometers, immersion bulbs, flow switches, drains, unions, etc.
- B. Install all control valves supplied by Automatic Temperature Control Contractor.

**3.13 AUTOMATIC TEMPERATURE CONTROL**

- A. Install the automatic temperature control dampers, air flow monitoring devices, openings for air flow switches, alarms and control devices as provided by the Automatic Temperature Control Contractor. These dampers and devices shall be installed under the direct supervision of the Section 23 0900, CONTROLS & CONTROL SEQUENCES Temperature Control Contractor and in strict accordance with the manufacturer's recommendations.

**END OF SECTION 23 2113**

**SECTION 23 7000  
VENTILATION**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. The work in this section of the specification and the accompanying drawings consists of performing all labor and furnishing of all material and equipment necessary to install air handling systems as indicated on drawings and specified herein, including minor items obviously necessary for complete and operating systems.
- B. Also included is the work involved to remove existing associated equipment, remodeling of existing systems, including connections between new and existing systems.

**1.3 SUBMITTALS**

- A. Shop Drawings: Shop drawings as specified in Section 23 0500 shall include the following:
  - 1. Registers, Grilles, and Diffusers
  - 2. Bi-Polar Needlepoint Ionization
  - 3. In-Space Disinfectant Distributors

**PART 2 - PRODUCTS**

**2.1 SHEET METAL WORK – LOW & MEDIUM PRESSURE SYSTEMS**

- A. See plans and insulation specifications for exposed ducts to be paint grip.
- B. Unless otherwise specified, construct ducts from galvanized iron fabricated and erected in a workmanlike manner. Fabricate plenums and special fittings, as shown on the Drawings, or as required. Access doors to plenums shall be double wall construction with heavy hardware. All ductwork shall be of the gauges hereinafter specified and constructed to the best grade Inland, U.S. Steel, United Sheet Metal or equal brands, heavily galvanized.
- C. Metal gauges for low and medium pressure duct systems shall be of metal gauges and reinforcing as recommended by SMACNA or as follows:

Max. Dimension of Rect.	
Ducts or Dia. of Round	Galvanized Sheet
<u>Low Pressure Ducts</u>	<u>Steel Gauge Number</u>
Up thru 12"	26
Over 12" thru 30"	24
Over 30" thru 54"	22
Over 54" thru 84"	20
Over 84"	18

Maximum Dimension of	
Rectangular Ducts or	
Diameter of Round	Galvanized Sheet
<u>Medium Pressure Ducts</u>	<u>Steel Gauge Number</u>
Up thru 18"	24
Over 19" thru 48"	22
Over 49" thru 72"	20
Over 73" thru 96"	18

- D. Ductwork shall be constructed, braced, reinforced and sealed as recommended by ASHRAE and SMACNA. Low pressure ductwork shall be suitable for pressures up to 2 inch w.g. Medium pressure ductwork shall be suitable for pressures up to 3 inch w.g. All ductwork 18

inches and greater in width shall be cross-broken. See SMACNA requirements for proper sealing of ductwork. All supply air ductwork between VAV air handling units and VAV terminals shall be medium pressure construction.

- E. Low pressure ductwork with the longest side 36" wide and over, or medium pressure ductwork shall be constructed using Ductmate 35/25 or equal slide on systems, per Ductmate Industries Installation Procedures and Duct Construction Standards, latest edition. The non-proprietary SMACNA T-22 Flanged Connection may be used as defined on Page 1-25 and 1-37, of the 1985 SMACNA Manual, First Edition. Ductmate 35/25 may be used for transverse joint construction, 35" wide and smaller. Ductmate 440 Butyl Gasket, or equal, shall be used between all rectangular transverse flanged duct connections, Ductmate's 440 Butyl Gasket, shall be used with the Ductmate Systems. For rectangular ductwork located outdoors, exposed to weather, construct ductwork per, 'Transverse Joints Rectangular' with using a continuous metal cleat on top joints of ducts for added weather protection. Slide on systems shall be Ductmate, Ward Industries, Inc., or equal.
- F. No obstruction shall be permitted in the ductwork to retard the flow of air. If it is necessary to run a pipe or conduit through a duct, the duct size shall be increased to compensate for the obstruction.
- G. Where space permits, duct turns shall be constructed with an inside radius equal to or greater than the duct width or duct turn vanes may be used. Where space does not permit duct turns as described above, duct turn vanes shall be used.
- H. Where interior duct insulation is required, increase the duct size to maintain the free area shown on the Drawings.
- I. Provide exterior insulated drip pans, 3 inches deep, under or adjacent to all roof and wall openings including but not limited to under all intake or relief hoods and louvers. Drip pans to be soldered watertight.
- J. Power operated dampers not furnished as a component of the ventilating machines will be furnished under the Temperature Control Specifications. They shall be installed in the ductwork under this specification. Caulk around all sides of high efficiency damper frames.
- K. Flexible connections shall be installed between suction and discharge openings in fan units and the ducts with which they are connected as shown on the Drawings, to prevent transmission of vibration noises. Material shall be watertight and fire retardant canvas weighing not less than 20 ounces per square yard, or shall be glass fabric on high temperature systems where fire hazard exists. Both materials shall be approved by Underwriter's Laboratories. The flexible material shall be furnished with all necessary angles, bolts, clips or other fasteners.
- L. Furnish and install access panels in the ductwork adjacent to all motorized dampers, fire dampers, louvers, reheat coils, and equipment which may require servicing or cleaning. Panels shall be tight fitting and shall be located so as to make them easily accessible. All panels installed in insulated ductwork shall be double wall, insulated type. Panels shall be Ruskin, Air Balance, Ventlok, ADCO, or equal.
- M. Dynamic rated fire dampers shall have an 18 inch square access panel or an 18 inch long removable duct section shall be installed adjacent to dynamic rated fire dampers in addition to a smaller inspection access panel. The removable section shall be assembled using Ductmate or equal duct joints. The joint at the damper shall be assembled with plastic fastener clips. Ductwork 24 inches and wider shall have an 18 inch by 18 inch access door in lieu of removable section.
- N. Ductwork installed above UL fire rated ceiling assemblies shall be installed in strict accordance with the provisions required by the UL Design Number designated in the Underwriters Laboratories Fire Resistance Directory.
- O. All ductwork visible through the face of a register or grille shall be painted with a flat black paint.
- P. All rigid and flexible ductwork materials installed shall have composite fire and smoke hazard ratings as tested by procedures ASTM 84, NFPA 255 and UL 723 not to exceed 25 Flame Spread and 50 Smoke Developed.

- Q. Concealed low pressure round ductwork may be rigid spiral ductwork or snaplock type with adjustable elbows.
- R. All exposed round ductwork and round ductwork to the inlet of VAV terminals shall be United, Semco, Norlock, Foremost or equal, rigid spiral duct and fittings.
- S. All exposed ductwork to be PAINTGRIP and shall be United, Semco, Norlock, Foremost or equal, rigid spiral duct and fittings. Refer to architectural reflected ceiling plans.
- T. Round ductwork shall be supported at 6 feet o.c. where building framing does not provide such support. Support shall be minimum 3/4 inch metal strap suspended from the roof or framing. Flexible duct shall not exceed 8 feet in length or pass through walls. Flexible round ductwork may only be used for final connections to supply registers and diffusers and shall not be used on return or exhaust ductwork.

## 2.2 DUCT HANGERS AND SUPPORTS

- A. Securely attach all ductwork to the building construction in a manner to be free of vibration and swaying under all conditions of operation. Hanger attachments shall be appropriate for the building structure and shall be subject to the A/E's approval. Hang ducts from beams and joist whenever possible.
- B. Ducts shall be substantially supported with hangers located according to SMACNA standards.

## 2.3 DUCT INSTALLATION

- A. Duct sizes shown on the drawings are nominal inside dimensions. Where internal insulation is provided, duct sizes must be increased appropriately to maintain indicated inside dimensions.
- B. All ductwork will be run substantially as shown on the plans with bends and curves. Changes in size or cross section shall be made with long tapers. The A/E reserves the right to slightly change the run of certain ducts without extra cost to the Owner, if necessary to avoid unforeseen structural or other interferences.
- C. Where ducts run through bar joists or other ceiling spaces and structural, mechanical, or electrical interference is encountered, maintain same cross sectional area as indicated on plans with a maximum of 4-1/2 to 1 aspect ratio.
- D. All openings in duct for grilles, registers, etc. shall be capped dust-tight with G.I. Metal caps during the construction period.
- E. Round branch duct connections to rectangular mains shall be made with round manual balancing dampers meeting the following specifications: Dampers shall consist of a 20 ga. Galvanized steel; 3/8" square plated steel axles turning in acetal bearings. Damper shall include optional 1-1/2" standoff bracket (with extended pin) to accommodate for the thickness of external duct insulation. Dampers have quadrant operator and shall be suitable for pressures to 1.0" w.g., velocities to 2000 f.p.m. and temperatures to 180 degrees F. Testing and ratings to be in accordance with AMCA Standard 500. Basis of design is Greenheck model MBDR-50.
- F. Exhaust/relief air, and air intake ducts shall be equipped with 3" deep watertight pans to collect moisture and condensate. Seal all joints with sealant.
- G. All changes in direction shall be made with curved elbows having a centerline radius equal to 1-1/2 times the duct width. Where space conditions prevent the use of curved elbows and/or where square turns are indicated, provide square turn elbows with turning vanes. Vanes may be either commercial type ducturns or equal, or shop fabricated to conform to SMACNA standards. Vanes shall be double thickness type pre-assembled on runners before installing in each elbow. Brace adequately and avoid rough edges to prevent objectionable noise.

## 2.4 REGISTERS, GRILLES, AND DIFFUSERS

- A. Furnish and install registers, grilles, and diffusers where shown on the Drawings. Type, size, and performance shall be as tabulated in the schedule and on the drawings. Provide & install accessories as scheduled on the plans.

## 2.5 BY ADD ALTERNATE: BI-POLAR NEEDLEPOINT IONIZATION

- A. GENERAL

1. DESCRIPTION OF WORK
  - a. This section describes the design, performance and installation of an air purification system intended for use as part of another manufacturer's air handling unit or mounted on the duct as shown on the plans, details and equipment schedules.
2. REFERENCED CODES & STANDARDS
  - a. The following codes and standards are referenced throughout. The edition to be used is that currently enforced by the authority having jurisdiction (AHJ) or in absence of such direction that referenced by the current enforceable IBC code or as indicated by the contract documents, except where specifically referenced by this section of the specifications.
    - 1) ASHRAE Standards 62 & 52
    - 2) National Electric Code NFPA 70
    - 3) UL 867-2007 including ozone chamber test required as of December 21, 2007
    - 4) UL 2998 Environment – No Ozone Certification
    - 5) The cold plasma equipment and power supply shall be UL listed.
    - 6) ASHRAE 62 now requires all electronic air cleaners to be UL 2998 certified as an ozone free device. Products without UL 2998 shall not be acceptable.
3. RELATED WORK
  - a. Testing, Adjusting and Balancing
  - b. Facility Access and Protection
  - c. Ductwork
  - d. Filters
  - e. Water and Refrigerant Piping
  - f. Electrical Wiring
  - g. Control Wiring
4. QUALITY and IP ASSURANCE
  - a. Basis of design is Global Plasma Solutions. All other manufacturers requesting prior approval must submit product drawings, specifications and test results specified in section "BI-POLAR IONIZATION DESIGN & PERFORMANCE CRITERIA" at least 7 days prior to bid date.
  - b. The Air Purification System shall be a product of an established manufacturer within the USA. Direct Current (DC) Ion modules manufactured outside the USA and assembled in the USA on mounting plates or formed channels shall not be acceptable.
  - c. A qualified representative from the manufacturer shall be available to inspect the installation of the air purification system to ensure installation in accordance with manufacturer's recommendation.
  - d. Technologies that do not address gas disassociation such as UV Lights, Powered Particulate Filters and/or polarized media filters shall not be considered. Uni-polar ion generators shall not be acceptable. "Plasma" particulate filters shall not be acceptable. Any system containing titanium dioxide (TiO<sub>2</sub>), which has been listed by the CDC as a known carcinogen, shall not be acceptable.
  - e. Projects designed using ASHRAE Standard 62, IAQ Procedure shall require the manufacturer to provide Indoor Air Quality calculations using the formulas within ASHRAE Standard 62.1-2019 to validate acceptable indoor air quality at the quantity of outside air scheduled with the technology submitted. The manufacturer shall provide independent test data on a previous installation performed within the last two years and in a similar application, that proves compliance to ASHRAE 62 and the accuracy of the calculations. The data shall be based on the manufacturer's use of the same make and model number as the equipment submitted on this project.
  - f. The Air Purification Technology shall have been tested by UL to prove conformance to UL 867-2007 including the ozone chamber testing and peak ozone test for electronic devices. Manufacturers that achieved UL 867 prior to December

21, 2007 and have not been tested in accordance with the newest UL 867 standard with the ozone amendment shall not be acceptable. All manufacturers requesting prior approval shall submit their independent UL 867 test data with ozone results to the engineer for preliminary review and during the submittal process. All manufacturers shall submit a copy with their quotation. Contractors shall not accept any proposal without the proper ozone testing documentation.

- g. The maximum allowable ozone concentration per the UL 2998 chamber test shall be 5 PPB. Manufacturers with ozone output exceeding these ozone values shall not be acceptable.
- h. All manufacturers shall have their product tested to UL 2998 Environmental Standard for confirmation of no ozone with certificate available. The final report shall indicate the ozone levels and high voltage output the device's electrode(s) were operating during the test. Reports that do not include high voltage output during the UL 2998 testing shall not be acceptable.

5. SUBMITTALS

- a. Product Data: Submit manufacturer's technical product data for ion generators including:
  - 1) Schedule of plasma generators indicating unit designation, number of each type required for each unit/application.
  - 2) Data sheet for each type of plasma generator, and accessory furnished; indicating construction, sizes, and mounting details.
  - 3) Performance data for each type of plasma device furnished.
  - 4) Indoor Air Quality calculations using the formulas within ASHRAE Standard 62.1-2007 to validate acceptable indoor air quality at the quantity of outside air Scheduled (when projects are designed with outside air reduction).
  - 5) Product drawings detailing all physical, electrical and control requirements.
  - 6) Copy of UL 867 independent ozone test.
  - 7) Copy of UL 2998 conformance certificate.
  - 8) Statement on the manufacturer's letterhead stating that the technology contains no titanium dioxide (TiO<sub>2</sub>).
- b. Operating & Maintenance Data: Submit O&M data and recommended spare parts lists.

6. PRODUCT DELIVERY, STORAGE AND HANDLING

- a. Deliver in factory fabricated shipping containers. Identify on outside of container type of product and location to be installed. Avoid crushing or bending.
- b. Store in original cartons and protect from weather and construction work traffic.
- c. Store indoors and in accordance with the manufacturers' recommendation for storage.

7. WARRANTY

- a. Equipment shall be warranted by the manufacturer against defects in material and workmanship for a period of eighteen months after shipment or twelve months from owner acceptance, whichever occurs first. Labor to replace equipment under warranty shall be provided by the owner or installing contractor.

B. PRODUCTS

1. GENERAL

- a. The air purification system(s) shall be of the size, type, arrangement and capacity indicated and required by the unit furnished and shall be of the manufacturer specified.
- b. Basis of Design: Global Plasma Solutions
- c. All other Suppliers of comparable products requesting prior approval shall:
  - 1) Submit for prior approval minimum 7 days in advance in accordance with the requirements of Section 23 0500.
  - 2) In addition, manufacturers submitting for prior approval for Bi-Polar Ionization must as part of the prior approval request provide their ASHRAE 62.1-2019 calculations that prove conformance to the ASHRAE Standard with the reduction of outside air to the scheduled values. A letter on the

manufacturer's letterhead requesting prior approval must accompany the request for prior approval stating their calculations are ASHRAE compliant. A third-party validation study performed on a previous installation of the same application using the same make and model equipment shall also be included.

- 3) Submit independent test data from UL showing ozone levels produced during the UL 867 ozone chamber test. Manufacturers without this test data shall not be acceptable.
  - 4) Submit UL 2998 Environmental Claim Certificate proving no ozone output.
  - 5) Submit pathogen testing per section "BI-POLAR IONIZATION DESIGN & PERFORMANCE CRITERIA"
  - 6) Submit at least two other end user references in the same application with contact phone number, email, equipment used and application for the equipment at that facility. Manufacturers not having the above references in similar applications using the same equipment models as proposed on the current project shall not be acceptable.
  - 7) Ionization bars manufactured using DC output ionization modules shall not be permitted due to corrosion, ion short-circuiting, and intermittent coil coverage and shock hazard.
  - 8) Ionization bars manufactured using ion modules not having epoxy coating all circuit boards and internal components shall not be acceptable.
  - 9) Manufacturers submitting as an alternate shall include their DO-160 test results.
  - 10) It is the responsibility of any alternate manufacturer and mechanical contractor proposing an alternate to the basis of design to confirm any proposed substituted product does not infringe on the intellectual property of the basis of design. The engineer and owner recognize the basis of design holds multiple patents and multiple patents are pending.
2. BI-POLAR IONIZATION DESIGN & PERFORMANCE CRITERIA
- a. Each piece of air handling equipment, so designated on the plans, details, equipment schedules and/or specifications shall contain a Plasma Generator with Bi-polar Ionization output as described here within.
  - b. The Bi-polar Ionization system shall be capable of:
    - 1) Effectively killing microorganisms downstream of the bi-polar ionization equipment (mold, bacteria, virus, etc.).
    - 2) Controlling gas phase contaminants generated from human occupants, building structure, furnishings and outside air contaminants.
    - 3) Capable of reducing static space charges.
    - 4) Effectively reducing space particle counts.
    - 5) When mounted to the air entering side of a cooling coil, keep the cooling coil free from pathogen and mold growth.
    - 6) All manufacturers shall provide documentation by an independent NELEC accredited laboratory that proves the product has minimum kill rates for the following pathogens given the allotted time and in a space condition:
      - A. MRSA - >96% in 30 minutes or less
      - B. E.coli - > 99% in 15 minutes or less
      - C. TB - > 69% in 60 minutes or less
      - D. C. diff - >86% in 30 minutes or less
      - E. Noro Virus -> 93.5% in 30 minutes or less
      - F. Legionella -> 99.7% in 30 minutes or less

Manufacturers not providing the equivalent space kill rates shall not be acceptable. All manufactures requesting prior approval shall provide to the engineer independent test data from a NELAP accredited independent lab confirming kill rates and time meeting the minimum requirements stated in section "BI-POLAR IONIZATION DESIGN &

PERFORMANCE CRITERIA", b, points 6A, 6B and 6C. Products tested only on Petri dishes to prove kill rates shall not be acceptable. Products being sold under different trade names than those tested shall not be acceptable.

- 7) Capable of modular field assembly in six inch (150mm) sections.
- c. The bi-polar ionization system shall operate in a manner such that equal amounts of positive and negative ions are produced. Uni-polar ion devices shall not be acceptable. Ionizers with positive and negative output (DC type) shall not be acceptable. All ionizers provided shall be AC type ionizers with one electrode pulsing between positive and negative.
  - 1) Air exchange rates may vary through the full operating range of a constant Volume or VAV system. The quantity of air exchange shall not be increased due to requirements of the air purification system.
  - 2) Velocity Profile: The air purification device shall not have maximum velocity profile.
- d. Humidity: Plasma Generators shall not require preheat protection when the relative humidity of the entering air exceeds 85%. Relative humidity from 0 - 100%, condensing, shall not cause damage, deterioration or dangerous conditions within the air purification system. Air purification system shall be capable of wash down duty.
- e. Equipment Requirements:
  - 1) Electrode Specifications (Bi-polar Ionization):
    - a) Each alternating current (AC) Ionization Bar with Bi-polar Ionization output shall include a minimum of eighteen carbon fiber cluster ion needles per foot of coil face width shall be provided. The entire cooling coil width shall have equal distribution of ionization across the face. Systems without ion needles at least 0.50" (12.5mm) apart shall not be acceptable. The plasma electrode shall require no more than 1.0" (25mm) in the direction of airflow for mounting. All hardware required for mounting shall be provided by the air purification manufacturer except self-tapping screws for the power supply. Bi-polar ionization tubes manufactured of glass and steel mesh shall not be acceptable due to replacement requirements, maintenance, and performance output reduction over time, ozone production and corrosion.
    - b) Electrodes shall be provided in 6.0" (150mm) increments, epoxy filled for an IP55 rating and utilizing brass connection hardware that is recessed into the connection joint once fully engaged and assembled.
    - c) Electrodes shall be energized when the main unit disconnect is turned on.
    - d) The ionization output shall be a minimum of 60 million ions/cc per inch of cooling coil width as measured 1 inch from the cold plasma needles.
    - e) Ionization bars shall be provided with magnet mounting kits to prevent penetration into cooling coils.
    - f) Ionization bars shall be constructed of UL 94VO and UL746C composite material.
    - g) If the ionization bars are mounted immediately downstream from a humidifier, protective rain covers shall be provided over the ionization bars by the installing contractor. The design of the cover shall be confirmed with the ionization manufacturer prior to installation.
- f. Air Handler Mounted Units:
  - 1) Where so indicated on the plans and/or schedules Plasma Generator(s) shall be supplied and installed. The mechanical contractor shall mount the Plasma Generator and wire it to the remote mount power supply using the cables provided by the air purification manufacturer. A 115VAC circuit shall be provided to the plasma generator power supply panel. No more than 15



- watts shall be required per power supply. Each power supply shall be capable of powering up to 6 ionization bars or a total of 50 linear feet of bar(s). Each plasma generator shall be designed with fiberglass housing, liquid tight flexible conduit and a high voltage quick connector.
- 2) Where the ionization bars are mounted downstream of steam humidifiers, the air handler manufacturer shall provide an angled hat section that will cover the ionization bars and deflect any direct condensation towards the floor and off the bars.
- g. Plasma Requirements:
- 1) Plasma Generators with Bi-polar ionization output shall be capable of controlling gas phase contaminants and shall be provided for all equipment listed above.
    - a) The Bi-polar ionization system shall consist of Bi-Polar Plasma Generator and power supply. The Bi-polar system shall be installed where indicated on the plans or specified to be installed. The device shall be capable of being powered by 115VAC without the use of an external transformer. Ionization systems requiring isolation transformers shall not be acceptable.
    - b) Ionization Output: The ionization output shall be controlled such that an equal number of positive and negative ions are produced (AC ionizers only are acceptable). Imbalanced levels shall not be acceptable.
    - c) Ionization output from each bar shall be a minimum of 120 million ions/cc per inch of bar when tested at 1" from the ionization bar. Bars with needles spaced further apart than 0.5" shall not be acceptable.
    - d) Each plasma electrode shall be made from an all fiberglass composite, UL 94V0 and UL 746C rated material for prevention of corrosion and electrical insulation.
  - 2) Ozone Generation:
    - a) The operation of the electrodes or Bi-polar ionization units shall conform to UL 2998 as tested by UL proving no ozone output.
- h. Electrical Requirements:
- 1) Wiring, conduit and junction boxes shall be installed within housing plenums in accordance with NEC NFPA 70. Plasma Generator shall accept an electrical service of 115 VAC, 1 phase, 50/60 Hz. The contractor shall coordinate electrical requirements with air purification manufacturer during submittals.
- i. Control Requirements:
- 1) All Plasma Generators shall have internal short circuit protection, overload protection, and automatic fault reset. Systems requiring fuses shall not be acceptable.
  - 2) The Plasma Generator power supply shall have internal circuitry to sense the ionization output and provide dry contact alarm status to the BMS as well as a local "Plasma On" indication light.
  - 3) If scheduled, the ionization system shall be provided with a stand-alone, independent ion sensor designed for duct mounting to the ionization bar to monitor the ion output and report to the BAS system that the ion device is working properly. Ion systems provided without an independent ion sensor, shall not be permitted. The control voltage to power the ion sensor shall be 24VAC to 260VAC and draw no more than 150mA of current. The sensor shall provide at minimum, dry contact status to the BAS and optionally a BacNet or Lonworks interface as specified on the control drawings. If scheduled, manufacturers not providing a stand-alone ion sensor shall not be acceptable.

- 4) The installing contractor shall mount and wire the Plasma device within the air handling unit specified or as shown on the plans. The contractor shall follow all manufacturer IOM instructions during installation.
  - 5) An optional fiberglass NEMA 4X panel with Plasma On/Off Indicator Light (interfaced with stand-alone ionization detector), Ionization Output On/Off Indicator Light and an On/Off Illuminated Switch shall be provided to house the power supply, if noted on the schedule.
- j. Wall Mounted Ion Meter
- 1) Provide & install GPS-iMEASURE permanently wall mounted ion detector to measure ion levels in the space.
  - 2) Ion Meter shall provide signal to building automation system.
  - 3) Ion Meter to include automatic calibration, automatic zero, 0-10VDC output, watchdog timer, bi-color operation status LED, 0 to 1,000,000 ions/cc range.
  - 4) Provide & install where indicated on plans.

**C. EXECUTION**

1. GENERAL

- a. The Contractor shall be responsible for maintaining all air systems until the owner accepts the building (Owner Acceptance).

2. ASSEMBLY & ERECTION: PLASMA GENERATOR

- a. All equipment shall be assembled and installed in a workman like manner to the satisfaction of the owner, architect, and engineer.
- b. Any material damaged by handling, water or moisture shall be replaced, by the mechanical contractor, at no cost to the owner.
- c. All equipment shall be protected from dust and damage on a daily basis throughout construction.

3. TESTING

- a. Provide the manufacturers recommended electrical tests.

4. COMMISSIONING & TRAINING

- a. A manufacturer's authorized representative shall provide start-up supervision and training of owner's personnel in the proper operation and maintenance of all equipment.

**2.6 BY ADD ALTERNATE: IN-SPACE DISINFECTANT DISTRIBUTORS**

**A. SUMMARY**

1. This section describes the design, performance and installation of an air purification system intended for use as part of another manufacturer's air handling unit mounted within the duct as shown on the plans, details, and equipment schedules.
2. This Section specifies NC2I units designed to kill mold, virus, bacteria, and odors. Units are intended for assembly within ductwork of building ventilation systems.

**B. DEFINITIONS**

1. NC2I - Natural Catalytic Converter Innovation - The process of introducing ultraviolet light in conjunction with a coated matrix to provide a continuous disinfection technology. The process is based on photocatalysis, which creates safe levels of hydrogen peroxide to attack viruses, bacteria, and mold at the molecular level.
2. NELAP - National Environmental Laboratory Accreditation Program

**C. Product Data:** For each type of product. Include dimensions; operating characteristics; required clearances and access; efficiency and test method; fire classification; furnished specialties; and accessories for each model indicated.

1. Shop Drawings: For each NC2I Device.
2. Include plans, elevations, sections, details, and attachments to other work.
3. Show unit dimensions, materials, and methods of assembly of components.
4. Include setting drawings, templates, and requirements for installing anchor materials.
5. Include diagrams for power, signal, and control wiring.

- D. Product Test Reports: For each NC2I Device, for tests performed by a qualified third-party testing agency and customer.
  - 1. Field quality-control reports.
- E. Any extra materials furnished that match products/sub-components installed shall be packaged with protective covering for storage and identified with labels describing contents.
- F. QUALITY ASSURANCE
  - 1. The NC2I Air Purification System shall be manufactured in an established manufacturer within the USA and shall meet the requirements of the "Buy America" program as outlined in 49CFR661.5.
  - 2. A qualified representative from the manufacturer shall be available to inspect the installation of the NC2I Units to ensure installation in accordance with manufacturer's recommendation.
  - 3. Technologies that do not address gas disassociation such as UV Lights, Powered Particulate Filters and/or polarized media filters are not acceptable. Bi-polar or Uni-polar ion generators shall not be acceptable. "Plasma" particulate filters shall not be acceptable.
  - 4. Projects designed using ASHRAE Standard 62.1, Indoor Air Quality (IAQ) Procedure shall require the manufacturer to provide Indoor Air Quality calculations using the formulas within ASHRAE Standard 62.1, to validate acceptable indoor air quality at the quantity of outside air scheduled with the technology submitted. The manufacturer shall provide independent test data on previous installations of similar applications, performed within the past two years, that proves compliance with ASHRAE 62.1 and the accuracy of the calculations.
  - 5. The maximum allowable ozone concentration per UL867 section 40 chamber test shall be 0.05 PPM. At minimum, the units shall be CARB certified so as to ensure compliance with this specification.
- G. Provide premanufactured Air Purification System of the size, type, arrangement and capacity indicated. Provide units as required to provide the required capability of killing mold, bacteria, and viruses in the air and on surfaces. Provide System units incorporated into/adjacent to the HVAC units furnished for the project.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Natural Catalytic Converter Innovation (NC2I) Units for duct mounted applications.
  - 2. Any manufacturer meeting or exceeding the specified requirements will be considered.
- H. Each piece of air handling equipment, so designated, details the equipment schedules and/or specifications as required to contain a NC2I unit output and power supply as described in this Specifications herein: Natural Catalytic Conversion Hydrogen Peroxide (H<sub>2</sub>O<sub>2</sub>) is a water molecule with an extra atom of oxygen with well-known antimicrobial properties. These low-level oxidizers are capable of killing mold, bacteria, viruses in the air and on surfaces.
- I. Provide NC2I unit system capable of the following:
  - 1. Provide (NC2I) "no-touch" disinfection technology that produces oxidizers, predominantly Hydrogen Peroxide out of ambient air.
  - 2. Provide system that effectively kills microorganisms downstream of the NC2I equipment in the air and on surfaces (mold, bacteria, virus, etc.).
  - 3. Provide documentation by an independent NELAC accredited laboratory that proves the product has minimum kill rates on surfaces for the following pathogens given the allotted time and in a space condition:
    - 4. MRSA > 99.98% in 6 hours
    - 5. Fungi > 95% in 6 hours
    - 6. Influenza (H1NI) > 99.93% in 6 hours
    - 7. MS2 > 99.993% in 6 hours

- J. Provide documentation by an independent NELAC accredited laboratory in accordance with ASHRAE Standard 241 Testing protocols, that proves the product has minimum kill rates in the air for the following pathogens given the allotted time and in a space condition:
  - 1. MS2 > 70% in 4 minutes
  - 2. MS2 > 80% in 12 minutes
  - 3. MS2 > 90% in 20 minutes
  - 4. MS2 > 96% in 30 minutes
  - 5. MS2 > 99.9% in 1 hour
- K. Provide system that operates to produce safe levels of Hydrogen Peroxide between .01-.04 ppm. At .04 ppm (at the high end), the concentration is more than 25 times lower than the OSHA safety limit of 1 ppm for an eight-hour shift.
- L. Production of ozone over 50 ppb as a byproduct or primary product of the catalytic reaction is not acceptable. Ozone can sometimes be called Activated Oxygen or Tri-Oxygen, for marketing purposes.
- M. System is designed for mounting on the side of ductwork or within HVAC equipment after the supply plenum at least 24 inches from the heating element, as scheduled on the drawings or as indicated in the Manufacturer's manual.
- N. System is capable of accepting 120-277 VAC.
- O. System does not require airflow to operate properly but only operates when airflow is present.
- P. Provide units capable of operation at -14° to 160°F temperature range, and 20-99% non-condensing humidity range.
- Q. Provide system units that do not require periodic maintenance beyond the normal replacement of the plasma bulb every 18 months and the entire NC2I Cell every 36 months.
- R. INSTALLATION
  - 1. Position each NC2I unit within existing duct work or within the ceiling, utilizing manufacture's clearance for normal service and maintenance. Anchor electronic NC2I units to substrate per manufacturer's written recommended installation procedures.
- S. CONTROL CONNECTIONS
  - 1. Install control and electrical power wiring to field-mounted control devices.
  - 2. Connect control wiring between controlled devices.
  - 3. Connect control wiring according to Section 260523 "Control-Voltage Electrical Power Cables."
- T. FIELD QUALITY CONTROL
  - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
  - 2. Perform any desired tests and inspections with the assistance of a factory-authorized service representative.
- U. CLEANING
  - 1. After completing system installation and testing, adjusting, and balancing air-handling and air-distribution systems, ascertain that NC2I units are clean and working per manufacturer's guidelines and instructions.

**END OF SECTION 23 7000**

Table of Contents – NSU - Barnett Center Locker Room Remodel OSE# R0124--16X

DIVISION 26 - ELECTRICAL

260500	COMMON WORK RESULTS FOR ELECTRICAL	4
260519	LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES	5
260526	GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS	5
260529	HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS	6
260533	RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS	8
260543	UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS	5
260553	IDENTIFICATION FOR ELECTRICAL SYSTEMS	7
260923	LIGHTING CONTROL DEVICES	6
262726	WIRING DEVICES	7
262813	FUSES	2
262816	ENCLOSED SWITCHES AND CIRCUIT BREAKERS	5
265119	LED INTERIOR LIGHTING	7
270500	COMMON WORK RESULTS FOR COMMUNICATIONS	4
271100	COMMUNICATIONS EQUIPMENT ROOM FITTINGS	4
271500	COMMUNICATIONS HORIZONTAL CABLING	11
280500	COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY	4
280513	CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY	12
283111	DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM	10

END OF TABLE OF CONTENTS

## SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Sleeves for raceways and cables.
  - 2. Sleeve seals.
  - 3. Grout.
  - 4. Common electrical installation requirements.

#### 1.2 SUBMITTALS

- A. Product Data: For sleeve seals.

### PART 2 - PRODUCTS

#### 2.1 SLEEVES FOR RACEWAYS AND CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Sleeves for Rectangular Openings: Galvanized sheet steel.
  - 1. Minimum Metal Thickness:
    - a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and no side more than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
    - b. 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), thickness shall be 0.138 inch (3.5 mm).

#### 2.2 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following:
  - a. Advance Products & Systems, Inc.
  - b. Calpico, Inc.
  - c. Metraflex Co.
  - d. Pipeline Seal and Insulator, Inc.
3. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
4. Pressure Plates: Plastic. Include two for each sealing element.
5. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

### 2.3 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

## PART 3 - EXECUTION

### 3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.

### 3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- 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. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. 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.
- E. Cut sleeves to length for mounting flush with both surfaces of walls.
- F. Extend sleeves installed in floors [2 inches (50 mm)] above finished floor level.
- G. Size pipe sleeves to provide [1/4-inch (6.4-mm)] annular clear space between sleeve and raceway or cable, unless indicated otherwise.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
  - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
- I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
- J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."
- K. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- M. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

### 3.3 SLEEVE-SEAL INSTALLATION

- A. Install to seal exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.



### 3.4 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION 260500

## SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Building wires and cables rated 600 V and less.
  - 2. Connectors, splices, and terminations rated 600 V and less.
  - 3. Sleeves and sleeve seals for cables.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.

#### 1.3 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. Comply with NFPA 70.

### PART 2 - PRODUCTS

#### 2.1 CONDUCTORS AND CABLES

- A. Copper Conductors: Comply with NEMA WC 70.
- B. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN.
- C. Multiconductor Cable: Multiconductor cable shall not be used.
- D. Aluminum Conductors: Aluminum conductors maybe used for feeders 100 amps and larger except where equipment is UL listed with copper conductors only.

#### 2.2 CONNECTORS AND SPLICES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. AFC Cable Systems, Inc.
2. Hubbell Power Systems, Inc.
3. O-Z/Gedney; EGS Electrical Group LLC.
4. 3M; Electrical Products Division.

- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

### 2.3 SLEEVES FOR CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

### 2.4 SLEEVE SEALS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: Subject to compliance with requirements, provide or a comparable product by one of the following:
  1. Advance Products & Systems, Inc.
  2. Calpico, Inc.
  3. Metraflex Co.
  4. Pipeline Seal and Insulator, Inc.
- D. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and cable.
  1. Sealing Elements: EPDM 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: Plastic. Include two for each sealing element.
  3. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

## PART 3 - EXECUTION

### 3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

### 3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type THHN-THWN, single conductors in raceway.
- B. Exposed Feeders: Type THHN-THWN, single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-THWN, single conductors in raceway.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- E. Exposed Branch Circuits, Including in Crawlspace: Type THHN-THWN, single conductors in raceway.
- F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.
- G. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- H. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.
- I. Class 1 Control Circuits: Type THHN-THWN, in raceway.
- J. Class 2 Control Circuits: Type THHN-THWN, in raceway.

### 3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- E. Support cables according to Division 26 Sections "Hangers and Supports for Electrical Systems."
- F. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."
- G. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- H. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
  - 1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.
- I. Wiring at Outlets: Install conductor at each outlet, with at least [6 inches (150 mm)] of slack.

#### 3.4 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."
- 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 wall surfaces.
- E. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level.
- F. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and cable 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 cable, using joint sealant appropriate for size, depth, and location of joint according to Division 07 Section "Joint Sealants."
- I. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at cable penetrations. Install sleeves and seal with firestop materials according to Division 07 Section "Penetration Firestopping."

- J. Roof-Penetration Sleeves: Seal penetration of individual cables with flexible boot-type flashing units applied in coordination with roofing work.
- K. Aboveground Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeves to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- L. Underground Exterior-Wall Penetrations: Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between cable and sleeve for installing mechanical sleeve seals.

### 3.5 SLEEVE-SEAL INSTALLATION

- A. Install to seal underground exterior-wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for cable material and size. Position cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

### 3.6 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07 Section "Penetration Firestopping."

### 3.7 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
- B. Tests and Inspections:
  - 1. After installing conductors and cables and before electrical circuitry has been energized, test for compliance with requirements.
  - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
- C. Test Reports: Prepare a written report to record the following:
  - 1. Test procedures used.
  - 2. Test results that comply with requirements.
  - 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- D. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 260519

## SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes: Grounding systems and equipment.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control reports.

#### 1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

### PART 2 - PRODUCTS

#### 2.1 CONDUCTORS

- A. Insulated Conductors: Copper or tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
  - 1. Solid Conductors: ASTM B 3.
  - 2. Stranded Conductors: ASTM B 8.
  - 3. Tinned Conductors: ASTM B 33.
  - 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
  - 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
  - 6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
  - 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

## 2.2 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
  - 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

## 2.3 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet (19 mm by 3 m) in diameter.

## PART 3 - EXECUTION

### 3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install barecopper conductor, No. 2/0 AWG minimum. Bury at least 24 inches (600 mm) below grade.
- C. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor 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.
- D. Conductor Terminations and Connections:
  - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
  - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
  - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
  - 4. Connections to Structural Steel: Welded connectors.

### 3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
  - 1. Feeders and branch circuits.
  - 2. Lighting circuits.



3. Receptacle circuits.
  4. Single-phase motor and appliance branch circuits.
  5. Three-phase motor and appliance branch circuits.
  6. Flexible raceway runs.
  7. Computer and Rack-Mounted Electronic Equipment Circuits: Install insulated equipment grounding conductor in branch-circuit runs from equipment-area power panels and power-distribution units.
- B. 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.
- C. Signal and Communication Equipment: In addition to grounding and bonding required by NFPA 70, provide a separate grounding system complying with requirements in TIA/ATIS J-STD-607-A.
1. For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
  2. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-4-by-12-inch (6.3-by-100-by-300-mm) grounding bus.
  3. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.
- D. Metal Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

### 3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade unless otherwise indicated.
1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
  2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- C. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Division 26 Section "Underground Ducts and Raceways for Electrical Systems," and shall be at least 12 inches (300 mm) deep, with cover.

1. Test Wells: Install at least one test well for each service unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.
- D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
  2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
  3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- E. Grounding and Bonding for Piping:
1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
  2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
  3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.
- F. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.

### 3.4 LABELING

- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems" Article for instruction signs. The label or its text shall be green.
- B. Install labels at the telecommunications bonding conductor and grounding equalizer and at the grounding electrode conductor where exposed.
  1. Label Text: "If this connector or cable is loose or if it must be removed for any reason, notify the facility manager."

### 3.5 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections and prepare test reports:
  1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.

2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
  3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Make tests at ground rods before any conductors are connected.
- B. Report measured ground resistances that exceed the following values:
1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
  2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
  3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
  4. Power Distribution Units or Panelboards Serving Electronic Equipment: 1 ohm(s).
- C. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

## SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes:
  - 1. Hangers and supports for electrical equipment and systems.
  - 2. Construction requirements for concrete bases.

#### 1.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

#### 1.3 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Comply with NFPA 70.

### PART 2 - PRODUCTS

#### 2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Allied Tube & Conduit.
    - b. Cooper B-Line, Inc.; a division of Cooper Industries.
    - c. ERICO International Corporation.
    - d. GS Metals Corp.
    - e. Thomas & Betts Corporation.
    - f. Unistrut; Tyco International, Ltd.
    - g. Wesanco, Inc.
  3. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
  4. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
  5. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
  6. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
    - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- 1) Hilti Inc.
  - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
  - 3) MKT Fastening, LLC.
  - 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
- a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - 1) Cooper B-Line, Inc.; a division of Cooper Industries.
    - 2) Empire Tool and Manufacturing Co., Inc.
    - 3) Hilti Inc.
    - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
    - 5) MKT Fastening, LLC.
3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
  4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
  5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
  6. Toggle Bolts: All-steel springhead type.
  7. Hanger Rods: Threaded steel.

## 2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.

## PART 3 - EXECUTION

### 3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
  - 1. Secure raceways and cables to these supports with single-bolt conduit clamps.
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

### 3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
  - 1. To Wood: Fasten with lag screws or through bolts.
  - 2. To New Concrete: Bolt to concrete inserts.
  - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
  - 4. To Existing Concrete: Expansion anchor fasteners.
  - 5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
  - 6. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
  - 7. To Light Steel: Sheet metal screws.
  - 8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.

- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

### 3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

### 3.4 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03 Section "Cast-in-Place Concrete."
- C. Anchor equipment to concrete base.
  - 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
  - 3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

### 3.5 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
  - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).
- B. Touchup: Comply with requirements in Division 09 painting Sections for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.



- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

## SECTION 260533 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
- B. See Division 26 Section "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks and manholes, and underground handholes, boxes, and utility construction.

#### 1.2 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, details, and attachments to other work.

#### 1.3 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. Comply with NFPA 70.

### PART 2 - PRODUCTS

#### 2.1 METAL CONDUIT AND TUBING

- A. Rigid Steel Conduit: ANSI C80.1.
- B. IMC: ANSI C80.6.
- C. EMT: ANSI C80.3.
- D. FMC: Zinc-coated steel.
- E. LFMC: Flexible steel conduit with PVC jacket.

- F. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
  - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.
  - 2. Fittings for EMT: Steel, compression type.

## 2.2 NONMETALLIC CONDUIT AND TUBING

- A. ENT: NEMA TC 13.
- B. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.
- C. LFNC: UL 1660.
- D. Fittings for ENT and RNC: NEMA TC 3; match to conduit or tubing type and material.
- E. Fittings for LFNC: UL 514B.

## 2.3 METAL WIREWAYS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Cooper B-Line, Inc.
  - 2. Hoffman.
  - 3. Square D; Schneider Electric.
- B. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 1, unless otherwise indicated.
- C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Wireway Covers: Screw-cover type.
- E. Finish: Manufacturer's standard enamel finish.

## 2.4 NONMETALLIC WIREWAYS

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

2. Lamson & Sessions; Carlon Electrical Products.

- B. Description: PVC plastic, extruded and fabricated to size and shape indicated, with snap-on cover and mechanically coupled connections with plastic fasteners.
- C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

## 2.5 SURFACE RACEWAYS

A. Surface Metal Raceways: Galvanized steel with snap-on covers. Manufacturer's standard enamel finish in color selected by Architect.

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Thomas & Betts Corporation.
  - b. Walker Systems, Inc.; Wiremold Company (The).
  - c. Wiremold Company (The); Electrical Sales Division.

B. Surface Nonmetallic Raceways: Two-piece construction, manufactured of rigid PVC with texture and color selected by Architect from manufacturer's standard colors.

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Butler Manufacturing Company; Walker Division.
  - b. Enduro Systems, Inc.; Composite Products Division.
  - c. Hubbell Incorporated; Wiring Device-Kellems Division.
  - d. Lamson & Sessions; Carlon Electrical Products.
  - e. Panduit Corp.
  - f. Walker Systems, Inc.; Wiremold Company (The).
  - g. Wiremold Company (The); Electrical Sales Division.

## 2.6 BOXES, ENCLOSURES, AND CABINETS

- A. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
- B. Cast-Metal Outlet and Device Boxes: NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- C. Nonmetallic Outlet and Device Boxes: NEMA OS 2.

- D. Metal Floor Boxes: Sheet metal, semi-adjustable, rectangular and equal to Steel City No. 664 with color selected by Architect from manufacturers standards.
- E. Nonmetallic Floor Boxes: Nonmetallic floor boxes shall not be used.
- F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- G. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.
- H. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.
  - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
  - 2. Nonmetallic Enclosures: Plastic.
- I. Cabinets:
  - 1. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
  - 2. Hinged door in front cover with flush latch and concealed hinge.
  - 3. Key latch to match panelboards.
  - 4. Metal barriers to separate wiring of different systems and voltage.
  - 5. Accessory feet where required for freestanding equipment.

## PART 3 - EXECUTION

### 3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
  - 1. Exposed Conduit: Rigid steel conduit.
  - 2. Concealed Conduit, Aboveground: EMT.
  - 3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried.
  - 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
  - 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Comply with the following indoor applications, unless otherwise indicated:
  - 1. Exposed, Not Subject to Physical Damage: EMT.
  - 2. Exposed, Not Subject to Severe Physical Damage: EMT.
  - 3. Exposed and Subject to Severe Physical Damage: Rigid steel conduit. Includes raceways in the following locations:

- a. Loading dock.
  - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
  - c. Mechanical rooms.
- 4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
  - 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
  - 6. Damp or Wet Locations: Rigid steel conduit.
  - 7. Raceways for Optical Fiber or Communications Cable: EMT.
  - 8. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel in damp or wet locations.
- C. Minimum Raceway Size: 1/2-inch (16-mm) trade size.
  - D. Raceway Fittings: Compatible with raceways and suitable for use and location.
    - 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

### 3.2 INSTALLATION

- A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.
- B. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems."
- E. Arrange stub-ups so curved portions of bends are not visible above the finished slab.
- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
- H. Raceways Embedded in Slabs:
  - 1. Run conduit larger than 1-inch (27-mm) trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.

2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
  3. Change from ENT to RNC, Type EPC-40-PVC, rigid steel conduit, or IMC before rising above the floor.
- I. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.
- J. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire.
- K. Raceways for Optical Fiber and Communications Cable: Install as follows:
1. 3/4-Inch (19-mm) Trade Size and Smaller: Install raceways in maximum lengths of 50 feet (15 m).
  2. 1-Inch (25-mm) Trade Size and Larger: Install raceways in maximum lengths of 75 feet (23 m).
  3. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.
- L. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
  2. Where otherwise required by NFPA 70.
- M. Expansion-Joint Fittings for RNC: Install in each run of aboveground conduit that is located where environmental temperature change may exceed 30 deg F (17 deg C), and that has straight-run length that exceeds 25 feet (7.6 m).
1. Install expansion-joint fittings for each of the following locations, and provide type and quantity of fittings that accommodate temperature change listed for location:
    - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F (70 deg C) temperature change.
    - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F (86 deg C) temperature change.
    - c. Indoor Spaces: Connected with the Outdoors without Physical Separation: 125 deg F (70 deg C) temperature change.
    - d. Attics: 135 deg F (75 deg C) temperature change.

2. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C) of temperature change.
  3. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at the time of installation.
- N. Flexible Conduit Connections: Use maximum of 72 inches (1830 mm) of flexible conduit for recessed and semirecessed lighting fixtures, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
1. Use LFMC in damp or wet locations subject to severe physical damage.
  2. Use LFMC in damp or wet locations not subject to severe physical damage.
- O. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.
- P. Set metal floor boxes level and flush with finished floor surface.
- Q. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

### 3.3 INSTALLATION OF UNDERGROUND CONDUIT

- A. Direct-Buried Conduit:
1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 31 Section "Earth Moving" for pipe less than 6 inches (150 mm) in nominal diameter.
  2. Install backfill as specified in Division 31 Section "Earth Moving."
  3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches (300 mm) of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 31 Section "Earth Moving."
  4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Encase elbows for stub-up ducts throughout the length of the elbow.
  5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.
    - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches (75 mm) of concrete.



- b. For stub-ups at equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches (1500 mm) from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.
- 6. Warning Planks: Bury warning planks approximately 12 inches (300 mm) above direct-buried conduits, placing them 24 inches (600 mm) o.c. Align planks along the width and along the centerline of conduit.

### 3.4 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION 260533

## SECTION 260543 - UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Conduit, ducts, and duct accessories for direct-buried duct banks, and in single duct runs.
2. Handholes and pull boxes.

#### 1.2 QUALITY ASSURANCE

- A. Comply with IEEE C2.
- B. Comply with NFPA 70.

### PART 2 - PRODUCTS

#### 2.1 CONDUIT

- A. Rigid Steel Conduit: Galvanized. Comply with ANSI C80.1.
- B. RNC: NEMA TC 2, Type EPC-40-PVC, UL 651, with matching fittings by same manufacturer as the conduit, complying with NEMA TC 3 and UL 514B.

#### 2.2 HANDHOLES AND PULL BOXES

##### A. Description: Comply with SCTE 77.

1. Color: Green.
2. Configuration: Units shall be designed for flush burial and have open bottom unless otherwise indicated.
3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.
4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
5. Cover Legend: Molded lettering,
  - a. As indicated for each service..
  - b. Tier level number, indicating that the unit complies with the structural load test for that tier according to SCTE 77.

6. Duct Entrance Provisions: Duct-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
  7. Handholes 12 inches wide by 24 inches long (300 mm wide by 600 mm long) and larger shall have factory-installed inserts for cable racks and pulling-in irons.
- B. Fiberglass Handholes and Pull Boxes with Polymer Concrete Frame and Cover: Complying with SCTE 77 Tier 5 loading. Sheet-molded, fiberglass-reinforced, polyester resin enclosure joined to polymer concrete top ring or frame.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  2. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following:
    - a. Armorcast Products Company.
    - b. Carson Industries LLC.
    - c. Christy Concrete Products.
    - d. Synertech Moulded Products, Inc.; a division of Oldcastle Precast.

### PART 3 - EXECUTION

#### 3.1 CORROSION PROTECTION

- A. Aluminum shall not be installed in contact with earth or concrete.

#### 3.2 EARTHWORK

- A. Excavation and Backfill: Comply with Division 31 Section "Earth Moving," but do not use heavy-duty, hydraulic-operated, compaction equipment.
- B. Restore surface features at areas disturbed by excavation and reestablish original grades unless otherwise indicated. Replace removed sod immediately after backfilling is completed.
- C. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching. Comply with Division 32 Sections "Turf and Grasses" and "Plants."
- D. Cut and patch existing pavement in the path of underground ducts and utility structures according to Division 01 Section "Cutting and Patching."

### 3.3 DUCT INSTALLATION

- A. Slope: Pitch ducts a minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope ducts from a high point in runs between two manholes to drain in both directions.
- B. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with a minimum radius of 48 inches (1220 mm), both horizontally and vertically, at other locations unless otherwise indicated.
- C. Joints: Use solvent-cemented joints in ducts and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent ducts do not lie in same plane.
- D. Duct Entrances to Manholes: Use end bells, spaced approximately 10 inches (250 mm) o.c. for 5-inch (125-mm) ducts, and vary proportionately for other duct sizes.
  - 1. Begin change from regular spacing to end-bell spacing 10 ft. (3 m) from the end bell without reducing duct line slope and without forming a trap in the line.
  - 2. Direct-Buried Duct Banks: Install an expansion and deflection fitting in each conduit in the area of disturbed earth adjacent to manhole or handhole.
  - 3. Grout end bells into structure walls from both sides to provide watertight entrances.
- E. Building Wall Penetrations: Make a transition from underground duct to rigid steel conduit at least 10 ft. (3 m) outside the building wall without reducing duct line slope away from the building and without forming a trap in the line. Use fittings manufactured for duct-to-conduit transition. Install conduit penetrations of building walls as specified in Division 26 Section "Common Work Results for Electrical."
- F. Sealing: Provide temporary closure at terminations of ducts that have cables pulled. Seal spare ducts at terminations. Use sealing compound and plugs to withstand at least 15-psig (1.03-MPa) hydrostatic pressure.
- G. Pulling Cord: Install 100-lbf- (445-N-) test nylon cord in ducts, including spares.
- H. Direct-Buried Duct Banks:
  - 1. Support ducts on duct separators coordinated with duct size, duct spacing, and outdoor temperature.
  - 2. Space separators close enough to prevent sagging and deforming of ducts, with not less than 4 spacers per 20 ft. (6 m) of duct. Secure separators to earth and to ducts to prevent displacement during backfill and yet permit linear duct movement due to expansion and contraction as temperature changes. Stagger spacers approximately 6 inches (150 mm) between tiers.
  - 3. Excavate trench bottom to provide firm and uniform support for duct bank. Prepare trench bottoms as specified in Division 31 Section "Earth Moving" for pipes less than 6 inches (150 mm) in nominal diameter.

4. Install backfill as specified in Division 31 Section "Earth Moving."
5. After installing first tier of ducts, backfill and compact. Start at tie-in point and work toward end of duct run, leaving ducts at end of run free to move with expansion and contraction as temperature changes during this process. Repeat procedure after placing each tier. After placing last tier, hand-place backfill to 4 inches (100 mm) over ducts and hand tamp. Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, make final duct connections at end of run and complete backfilling with normal compaction as specified in Division 31 Section "Earth Moving."
6. Install ducts with a minimum of 3 inches (75 mm) between ducts for like services and 6 inches (150 mm) between power and signal ducts.
7. Depth: Install top of duct bank at least 36 inches (900 mm) below finished grade unless otherwise indicated.
8. Set elevation of bottom of duct bank below the frost line.
9. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor unless otherwise indicated. Encase elbows for stub-up ducts throughout the length of the elbow.
10. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.
  - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches (75 mm) of concrete.
  - b. For equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches (1500 mm) from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.

### 3.4 INSTALLATION OF HANDHOLES AND PULL BOXES

- A. Install handholes and pull boxes level and plumb and with orientation and depth coordinated with connecting ducts to minimize bends and deflections required for proper entrances. Use pull box extension if required to match depths of ducts, and seal joint between box and extension as recommended by the manufacturer.
- B. Unless otherwise indicated, support units on a level 6-inch- (15-cm-) thick bed of crushed stone or gravel, graded from 1/2-inch (12.7-mm) sieve to No. 4 (4.75-mm) sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: Set so cover surface will be flush with finished grade.
- D. Install handholes and pull boxes with bottom below the frost line, below grade.
- E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Retain arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in the enclosure.

- F. Field-cut openings for ducts and conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.
- G. For enclosures installed in asphalt paving and subject to occasional, nondeliberate, heavy-vehicle loading, form and pour a concrete ring encircling, and in contact with, enclosure and with top surface screeded to top of box cover frame. Bottom of ring shall rest on.
  - 1. Concrete: 3000 psi (20 kPa), 28-day strength, complying with Division 03 Section "Cast-in-Place Concrete," with a troweled finish.
  - 2. Dimensions: 10 inches wide by 12 inches deep (250 mm wide by 300 mm deep).

### 3.5 GROUNDING

- A. Ground underground ducts and utility structures according to Division 26 Section "Grounding and Bonding for Electrical Systems."

### 3.6 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
  - 1. Demonstrate capability and compliance with requirements on completion of installation of underground ducts and utility structures.
- B. Correct deficiencies and retest as specified above to demonstrate compliance.
- C. Prepare test and inspection reports.

### 3.7 CLEANING

- A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of ducts. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.
- B. Clean internal surfaces of manholes, including sump. Remove foreign material.

END OF SECTION 260543

## SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Underground-line warning tape.
5. Warning labels and signs.
6. Instruction signs.
7. Equipment identification labels.
8. Miscellaneous identification products.

#### 1.2 SUBMITTALS

- ##### A. Product Data: For each electrical identification product indicated.

#### 1.3 QUALITY ASSURANCE

- ##### A. Comply with ANSI A13.1.
- ##### B. Comply with NFPA 70.
- ##### C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- ##### 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.

### PART 2 - PRODUCTS

#### 2.1 POWER RACEWAY IDENTIFICATION MATERIALS

- ##### A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- ##### B. Colors for Raceways Carrying Circuits at 600 V or Less:
1. Black letters on an orange field.
  2. Legend: Indicate voltage.

- C. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- D. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- E. Snap-Around, Color-Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- F. Write-On Tags: Polyester tag, 0.015 inch (0.38 mm) thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
  - 1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
  - 2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

## 2.2 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- C. Write-On Tags: Polyester tag, 0.015 inch (0.38 mm) thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
  - 1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
  - 2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.
- D. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- E. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

## 2.3 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.



- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- C. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
- D. Write-On Tags: Polyester tag, 0.015 inch (0.38 mm) thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
  - 1. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

#### 2.4 FLOOR MARKING TAPE

- A. 2-inch- (50-mm-) wide, 5-mil (0.125-mm) pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

#### 2.5 UNDERGROUND-LINE WARNING TAPE

- A. Tape:
  - 1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
  - 2. Printing on tape shall be permanent and shall not be damaged by burial operations.
  - 3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.
- B. Color and Printing:
  - 1. Comply with ANSI Z535.1 through ANSI Z535.5.
  - 2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE,.
  - 3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE,.

#### 2.6 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
- C. Baked-Enamel Warning Signs:
  - 1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
  - 2. 1/4-inch (6.4-mm) grommets in corners for mounting.
  - 3. Nominal size, 7 by 10 inches (180 by 250 mm).

- D. Warning label and sign shall include, but are not limited to, the following legends:
1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
  2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."

## 2.7 INSTRUCTION SIGNS

- A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. inches (129 sq. cm) and 1/8 inch (3.2 mm) thick for larger sizes.
1. Engraved legend with black letters on white face.
  2. Punched or drilled for mechanical fasteners.
  3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.
- B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).
- C. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.

## 2.8 EQUIPMENT IDENTIFICATION LABELS

- A. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.
- B. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).
- C. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch (25 mm).

## 2.9 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in Division 09 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- B. Apply identification devices to surfaces that require finish after completing finish work.
- C. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- D. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- E. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands 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.
- F. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench exceeds 16 inches (400 mm) overall.
- G. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.

### 3.2 IDENTIFICATION SCHEDULE

- A. Accessible Raceways, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A, and 120 V to ground: Install labels at 30-foot (10-m) maximum intervals.
- B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
  - 1. Emergency Power.
  - 2. Power.
  - 3. UPS.
- C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
  - 1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.
    - a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.

- b. Colors for 208/120-V Circuits:
  - 1) Phase A: Black.
  - 2) Phase B: Red.
  - 3) Phase C: Blue.
- c. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- D. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
- E. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.
- F. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
  - 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
  - 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
  - 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
- G. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
  - 1. Limit use of underground-line warning tape to direct-buried cables.
  - 2. Install underground-line warning tape for both direct-buried cables and cables in raceway.
- H. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- I. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.
  - 1. Comply with 29 CFR 1910.145.
  - 2. Identify system voltage with black letters on an orange background.
  - 3. Apply to exterior of door, cover, or other access.
  - 4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
    - a. Power transfer switches.
    - b. Controls with external control power connections.

- J. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- K. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- (10-mm-) high letters for emergency instructions at equipment used for power transfer.
- L. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
  - 1. Labeling Instructions:
    - a. Indoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.
    - b. Outdoor Equipment: Stenciled legend 4 inches (100 mm) high.
    - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
    - d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

END OF SECTION 260553

## SECTION 260923 - LIGHTING CONTROL DEVICES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes the following lighting control devices:
  - 1. Time switches.
  - 2. Outdoor photoelectric switches.
  - 3. Indoor occupancy sensors.
  - 4. Outdoor motion sensors.
  - 5. Lighting contactors.
  - 6. Emergency shunt relay.
- B. See Division 26 Section "Wiring Devices" for wall-box dimmers, wall-switch occupancy sensors, and manual light switches.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.
- C. Operation and maintenance data.

#### 1.3 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.

### PART 2 - PRODUCTS

#### 2.1 TIME SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Area Lighting Research, Inc.; Tyco Electronics.
  - 2. Grasslin Controls Corporation; a GE Industrial Systems Company.
  - 3. Intermatic, Inc.
  - 4. Leviton Mfg. Company Inc.
  - 5. Lightolier Controls; a Genlyte Company.

6. Lithonia Lighting; Acuity Lighting Group, Inc.
7. Paragon Electric Co.; Invensys Climate Controls.
8. Square D; Schneider Electric.
9. TORK.
10. Touch-Plate, Inc.
11. Watt Stopper (The).

B. Electronic Time Switches: Electronic, solid-state programmable units with alphanumeric display; complying with UL 917.

1. Contact Configuration: DPDT.
2. Contact Rating: 30-A inductive or resistive, 240-V ac 20-A ballast load, 120/240-V ac.
3. Program: 8 on-off set points on a 24-hour schedule and an annual holiday schedule that overrides the weekly operation on holidays.
4. Programs: Two channels; each channel shall be individually programmable with 8 on-off set points on a 24-hour schedule.
5. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program on selected channels.
6. Astronomic Time: All channels.
7. Battery Backup: For schedules and time clock.

## 2.2 OUTDOOR PHOTOELECTRIC SWITCHES

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

1. Area Lighting Research, Inc.; Tyco Electronics.
2. Grasslin Controls Corporation; a GE Industrial Systems Company.
3. Intermatic, Inc.
4. Lithonia Lighting; Acuity Lighting Group, Inc.
5. Novitas, Inc.
6. Paragon Electric Co.; Invensys Climate Controls.
7. Square D; Schneider Electric.
8. TORK.
9. Touch-Plate, Inc.
10. Watt Stopper (The).

B. Description: Solid state, with SPST dry contacts rated for 1800-VA tungsten or 1000-VA inductive, to operate connected relay, contactor coils, or microprocessor input; complying with UL 773A.

1. Light-Level Monitoring Range: 1.5 to 10 fc (16.14 to 108 lx), with an adjustment for turn-on and turn-off levels within that range, and a directional lens in front of photocell to prevent fixed light sources from causing turn-off.
2. Time Delay: 15-second minimum, to prevent false operation.
3. Surge Protection: Metal-oxide varistor, complying with IEEE C62.41.1, IEEE C62.41.2, and IEEE 62.45 for Category A1 locations.

## 2.3 INDOOR OCCUPANCY SENSORS

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

1. Hubbell Lighting.
2. Leviton Mfg. Company Inc.
3. Lithonia Lighting; Acuity Lighting Group, Inc.
4. Novitas, Inc.
5. RAB Lighting, Inc.
6. Sensor Switch, Inc.
7. TORK.
8. Watt Stopper (The).

B. General Description: Wall- or ceiling-mounting, solid-state units with a separate relay unit.

1. Operation: Unless otherwise indicated, turn lights on when covered area is occupied and off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
2. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor shall be powered from the relay unit.
3. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
4. Mounting:
  - a. Sensor: Suitable for mounting in any position on a standard outlet box.
  - b. Relay: Externally mounted through a 1/2-inch (13-mm) knockout in a standard electrical enclosure.
  - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
5. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.
6. Bypass Switch: Override the on function in case of sensor failure.
7. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc (21.5 to 2152 lx); keep lighting off when selected lighting level is present.

C. PIR Type: Ceiling mounting; detect occupancy by sensing a combination of heat and movement in area of coverage.

1. Detector Sensitivity: Detect occurrences of 6-inch- (150-mm-) minimum movement of any portion of a human body that presents a target of not less than 36 sq. in. (232 sq. cm).
2. Detection Coverage (Room): Detect occupancy anywhere in a circular area of 1000 sq. ft. (93 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.
3. Detection Coverage (Corridor): Detect occupancy within 90 feet (27.4 m) when mounted on a 10-foot- (3-m-) high ceiling.



## 2.4 LIGHTING CONTACTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Allen-Bradley/Rockwell Automation.
  2. ASCO Power Technologies, LP; a division of Emerson Electric Co.
  3. Eaton Electrical Inc.; Cutler-Hammer Products.
  4. GE Industrial Systems; Total Lighting Control.
  5. Grasslin Controls Corporation; a GE Industrial Systems Company.
  6. Hubbell Lighting.
  7. Lithonia Lighting; Acuity Lighting Group, Inc.
  8. MicroLite Lighting Control Systems.
  9. Square D; Schneider Electric.
  10. TORK.
  11. Touch-Plate, Inc.
  12. Watt Stopper (The).
- B. Description: Electrically operated and electrically held, combination type with nonfused disconnect, complying with NEMA ICS 2 and UL 508.
1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less total harmonic distortion of normal load current).
  2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
  3. Enclosure: Comply with NEMA 250.

## 2.5 CONDUCTORS AND CABLES

- A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 22 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 16 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

## PART 3 - EXECUTION

### 3.1 SENSOR INSTALLATION

- A. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

- B. When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose.

### 3.2 CONTACTOR INSTALLATION

- A. Mount electrically held lighting contactors with elastomeric isolator pads, to eliminate structure-borne vibration, unless contactors are installed in an enclosure with factory-installed vibration isolators.

### 3.3 WIRING INSTALLATION

- A. Wiring Method: Comply with Division 26 Section "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size shall be 1/2 inch (13 mm).
- B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- C. Size conductors according to lighting control device manufacturer's written instructions, unless otherwise indicated.
- D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

### 3.4 IDENTIFICATION

- A. Identify components and power and control wiring according to Division 26 Section "Identification for Electrical Systems."
  - 1. Identify controlled circuits in lighting contactors.
  - 2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.
- B. Label time switches and contactors with a unique designation.

### 3.5 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
  - 1. After installing time switches and sensors, and after electrical circuitry has been energized, adjust and test for compliance with requirements.
  - 2. Operational Test: Verify operation of each lighting control device, and adjust time delays.
- B. Lighting control devices that fail tests and inspections are defective work.

END OF SECTION 260923

## SECTION 262726 - WIRING DEVICES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
  - 2. Wall-box motion sensors.
  - 3. Snap switches and wall-box dimmers.
  - 4. Solid-state fan speed controls.
  - 5. Wall-switch and exterior occupancy sensors.
- B. See Division 27 Section "Communications Horizontal Cabling" for workstation outlets.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

#### 1.3 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. Comply with NFPA 70.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
  - 1. Cooper Wiring Devices; a division of Cooper Industries, Inc. (Cooper).
  - 2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
  - 3. Leviton Mfg. Company Inc. (Leviton).

4. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).

## 2.2 STRAIGHT BLADE RECEPTACLES

- A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
  1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Cooper; 5351 (single), 5352 (duplex).
    - b. Hubbell; HBL5351 (single), CR5352 (duplex).
    - c. Leviton; 5891 (single), 5352 (duplex).
    - d. Pass & Seymour; 5381 (single), 5352 (duplex).

## 2.3 GFCI RECEPTACLES

- A. General Description: Straight blade, feed-through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.
- B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:
  1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Cooper; GF20.
    - b. Pass & Seymour; 2084.
    - c. Hubbell;
    - d. Leviton;

## 2.4 SNAP SWITCHES

- A. Comply with NEMA WD 1 and UL 20.
- B. Switches, 120/277 V, 20 A:
  1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Cooper; 2221 (single pole), 2222 (two pole), 2223 (three way), 2224 (four way).
    - b. Hubbell; CS1221 (single pole), CS1222 (two pole), CS1223 (three way), CS1224 (four way).
    - c. Leviton; 1221-2 (single pole), 1222-2 (two pole), 1223-2 (three way), 1224-2 (four way).
    - d. Pass & Seymour; 20AC1 (single pole), 20AC2 (two pole), 20AC3 (three way), 20AC4 (four way).
- C. Pilot Light Switches, 20 A:
  1. Products: Subject to compliance with requirements, provide one of the following:

- a. Cooper; 2221PL for 120 V and 277 V.
  - b. Hubbell; HPL1221PL for 120 V and 277 V.
  - c. Leviton; 1221-PLR for 120 V, 1221-7PLR for 277 V.
  - d. Pass & Seymour; PS20AC1-PLR for 120 V.
2. Description: Single pole, with neon-lighted handle, illuminated when switch is "ON."
- D. Key-Operated Switches, 120/277 V, 20 A:
- 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Cooper; 2221L.
    - b. Hubbell; HBL1221L.
    - c. Leviton; 1221-2L.
    - d. Pass & Seymour; PS20AC1-L.
  - 2. Description: Single pole, with factory-supplied key in lieu of switch handle.
- E. Single-Pole, Double-Throw, Momentary Contact, Center-Off Switches, 120/277 V, 20 A; for use with mechanically held lighting contactors.
- 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Cooper; 1995.
    - b. Hubbell; HBL1557.
    - c. Leviton; 1257.
    - d. Pass & Seymour; 1251.
- F. Key-Operated, Single-Pole, Double-Throw, Momentary Contact, Center-Off Switches, 120/277 V, 20 A; for use with mechanically held lighting contactors, with factory-supplied key in lieu of switch handle.
- 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Cooper; 1995L.
    - b. Hubbell; HBL1557L.
    - c. Leviton; 1257L.
    - d. Pass & Seymour; 1251L.

## 2.5 WALL-BOX DIMMERS

- A. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters.
- B. Control: Continuously adjustable slider; with single-pole or three-way switching. Comply with UL 1472.
- C. Incandescent Lamp Dimmers: 120 V; control shall follow square-law dimming curve. On-off switch positions shall bypass dimmer module.

1. 1500 W; dimmers shall require no derating when ganged with other devices.
- D. Fluorescent Lamp Dimmer Switches: Modular; compatible with dimmer ballasts; trim potentiometer to adjust low-end dimming; dimmer-ballast combination capable of consistent dimming with low end not greater than 20 percent of full brightness.

## 2.6 OCCUPANCY SENSORS

### A. Wall or Ceiling -Switch Sensors:

1. Products: Subject to compliance with requirements, provide one of the following:
  - a. Cooper;
  - b. Hubbell;
  - c. Leviton;
  - d. Pass & Seymour;
  - e. Watt Stopper (The);
2. Description: Passive-infrared and ultra sonic type, 120/277 V, adjustable time delay up to 30 minutes, 180-degree field of view, with a minimum coverage area of 900 sq. ft. (84 sq. m).

## 2.7 WALL PLATES

### A. Single and combination types to match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Stainless steel 302.
3. Material for Unfinished Spaces: Galvanized steel.
4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in "wet locations."
5. Special colors as noted on the plans. See drawings for additional information.

### B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with type 3R weather-resistant, die-cast aluminum with lockable cover.

## 2.8 FINISHES

### A. Color: Wiring device catalog numbers in Section Text do not designate device color.

1. Wiring Devices Connected to Normal Power System: grey, unless otherwise indicated on the drawings or required by NFPA 70 or device listing.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.
- B. Coordination with Other Trades:
  - 1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
  - 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
  - 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
  - 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
  - 1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
  - 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
  - 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
  - 4. Existing Conductors:
    - a. Cut back and pigtail, or replace all damaged conductors.
    - b. Straighten conductors that remain and remove corrosion and foreign matter.
    - c. Pigtailing existing conductors is permitted provided the outlet box is large enough.
- D. Device Installation:
  - 1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
  - 2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
  - 3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
  - 4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
  - 5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
  - 6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
  - 7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
  - 8. Tighten unused terminal screws on the device.



9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.
- E. Receptacle Orientation:
1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the left.
- F. 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.
- G. Dimmers:
1. Install dimmers within terms of their listing.
  2. Verify that dimmers used for fan speed control are listed for that application.
  3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.
- H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

### 3.2 IDENTIFICATION

- A. Comply with Division 26 Section "Identification for Electrical Systems."
1. Receptacles: Identify panelboard and circuit number from which served for all electrical devices connected to the emergency generator. Use hot, stamped or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

### 3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
1. Test Instruments: Use instruments that comply with UL 1436.
- B. Tests for Convenience Receptacles:
1. Line Voltage: Acceptable range is 105 to 132 V.
  2. Ground Impedance: Values of up to 2 ohms are acceptable.
  3. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
  4. Using the test plug, verify that the device and its outlet box are securely mounted.
  5. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new, and retest as specified above.

END OF SECTION 262726

## SECTION 262813 - FUSES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes: Cartridge fuses rated 600-V ac and less for use in control circuits, enclosed and switches enclosed controllers.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Operation and maintenance data.

#### 1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NEMA FU 1 for cartridge fuses.
- C. Comply with NFPA 70.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Cooper Bussmann, Inc.
  - 2. Edison Fuse, Inc.
  - 3. Ferraz Shawmut, Inc.
  - 4. Littelfuse, Inc.

#### 2.2 CARTRIDGE FUSES

- A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

## PART 3 - EXECUTION

### 3.1 FUSE APPLICATIONS

- A. Motor Branch Circuits: Class RK5, time delay.
- B. Other Branch Circuits: Class RK5, time delay.
- C. Control Circuits: Class CC, fast acting.

### 3.2 INSTALLATION

- A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

### 3.3 IDENTIFICATION

- A. Install labels complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block and holder.

END OF SECTION 262813

## SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Fusible switches.
  - 2. Nonfusible switches.
  - 3. Receptacle switches.
  - 4. Shunt trip switches.
  - 5. Molded-case circuit breakers (MCCBs).
  - 6. Enclosures.

#### 1.2 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated.
- B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.
  - 1. Wiring Diagrams: For power, signal, and control wiring.
- C. Seismic Qualification Certificates: For enclosed switches and circuit breakers, accessories, and components, from manufacturer.
- D. Field quality-control reports.
- E. Operation and maintenance data.

#### 1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

- B. Comply with NFPA 70.

## PART 2 - PRODUCTS

### 2.1 FUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
  - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
  - 3. Siemens Energy & Automation, Inc.
  - 4. Square D; a brand of Schneider Electric.
- B. Type HD, Heavy Duty, Single Throw, 240-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:
  - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
  - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
  - 3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
  - 4. Lugs: Suitable for number, size, and conductor material.
  - 5. Service-Rated Switches: Labeled for use as service equipment.

### 2.2 NONFUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
  - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
  - 3. Siemens Energy & Automation, Inc.
  - 4. Square D; a brand of Schneider Electric.
- B. Type HD, Heavy Duty, Single Throw, 240-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:
  - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.

2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Lugs: Suitable for number, size, and conductor material.

## 2.3 MOLDED-CASE CIRCUIT BREAKERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
  2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
  3. Siemens Energy & Automation, Inc.
  4. Square D; a brand of Schneider Electric.
- B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.
- C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
- D. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:
  1. Instantaneous trip.
  2. Long- and short-time pickup levels.
  3. Long- and short-time time adjustments.
  4. Ground-fault pickup level, time delay, and  $I^2t$  response.
- E. Features and Accessories:
  1. Standard frame sizes, trip ratings, and number of poles.
  2. Lugs: Suitable for number, size, trip ratings, and conductor material.
  3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
  4. Ground-Fault Protection: Comply with UL 1053; integrally mounted, self-powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.

## 2.4 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
  1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
  2. Outdoor Locations: NEMA 250, Type 3R.
  3. Kitchen Areas: NEMA 250, Type 4X, stainless steel.

4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- C. Install fuses in fusible devices.
- D. Comply with NECA 1.

### 3.2 IDENTIFICATION

- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems."
  1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
  2. Label each enclosure with engraved metal or laminated-plastic nameplate.

### 3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Acceptance Testing Preparation:
  1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
  2. Test continuity of each circuit.
- C. Tests and Inspections:
  1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
  2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.



END OF SECTION 262816

## SECTION 265119 - LED INTERIOR LIGHTING

### 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 the following types of LED luminaires:
  - 1. Downlight.
  - 2. Linear industrial.
  - 3. Lowbay.
  - 4. Recessed, linear.
  - 5. Strip light.
  - 6. Surface mount, linear.
- B. Related Requirements:
  - 1. None.

#### 1.3 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color Rendering Index.
- C. Fixture: See "Luminaire."
- D. IP: International Protection or Ingress Protection Rating.
- E. LED: Light-emitting diode.
- F. Lumen: Measured output of lamp and luminaire, or both.
- G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Arrange in order of luminaire designation.
  - 2. Include data on features, accessories, and finishes.
  - 3. Include physical description and dimensions of luminaires.

4. Include emergency lighting units, including batteries and chargers.
5. Include life, output (lumens, CCT, and CRI), and energy-efficiency data.
6. Photometric data and adjustment factors based on laboratory tests[, complying with IES "Lighting Measurements Testing and Calculation Guides" for each luminaire type. The adjustment factors shall be for lamps and accessories identical to those indicated for the luminaire as applied in this Project] [IES LM-79] [and] [IES LM-80].
  - a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
  - b. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.

B. Shop Drawings: For nonstandard or custom luminaires.

1. Include plans, elevations, sections, and mounting and attachment details.
2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

C. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.

## 1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Luminaires.
2. Suspended ceiling components.
3. Partitions and millwork that penetrate the ceiling or extend to within 12 inches (300 mm) of the plane of the luminaires.
4. Structural members to which luminaires will be attached.
5. Initial access modules for acoustical tile, including size and locations.
6. Items penetrating finished ceiling, including the following:
  - a. Other luminaires.
  - b. Air outlets and inlets.
  - c. Speakers.
  - d. Sprinklers.
  - e. Access panels.
  - f. Ceiling-mounted projectors.

7. Moldings.

B. Qualification Data: For testing laboratory providing photometric data for luminaires.

- C. Sample warranty.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.
  - 1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

#### 1.7 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.
- B. Provide luminaires from a single manufacturer for each luminaire type.
- C. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

#### 1.9 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
- B. Warranty Period: Five year(s) from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 LUMINAIRE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
  - 1. Label shall include the following lamp characteristics:
    - a. "USE ONLY" and include specific lamp type.

- b. Lamp diameter, shape, size, wattage, and coating.
  - c. CCT and CRI.
- C. Recessed luminaires shall comply with NEMA LE 4.
- D. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.
- E. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.
- F. California Title 24 compliant.
- G. With integral mounting provisions.
  - 1. UL Listing: Listed for damp location.

## 2.2 MATERIALS

- A. Metal Parts:
  - 1. Free of burrs and sharp corners and edges.
  - 2. Sheet metal components shall be steel unless otherwise indicated.
  - 3. Form and support to prevent warping and sagging.
- B. Steel:
  - 1. ASTM A 36/A 36M for carbon structural steel.
  - 2. ASTM A 568/A 568M for sheet steel.
- C. Stainless Steel:
  - 1. 1. Manufacturer's standard grade.
  - 2. 2. Manufacturer's standard type, ASTM A 240/240 M.
- D. Galvanized Steel: ASTM A 653/A 653M.
- E. Aluminum: ASTM B 209.

## 2.3 METAL FINISHES

- A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

## 2.4 LUMINAIRE SUPPORT

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

- B. Single-Stem Hangers: 1/2-inch (13-mm) steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.
- C. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, [12 gage (2.68 mm)] .
- D. Rod Hangers: 3/16-inch (5-mm) minimum diameter, cadmium-plated, threaded steel rod.
- E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 TEMPORARY LIGHTING

- A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is sufficiently complete, clean luminaires used for temporary lighting and install new lamps.

### 3.3 INSTALLATION

- A. Comply with NECA 1.
- B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- C. Install lamps in each luminaire.
- D. Supports:
  - 1. Sized and rated for luminaire weight.
  - 2. Able to maintain luminaire position after cleaning and relamping.
  - 3. Provide support for luminaire without causing deflection of ceiling or wall.
  - 4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.
- E. Flush-Mounted Luminaires:
  - 1. Secured to outlet box.

2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
3. Trim ring flush with finished surface.

F. Wall-Mounted Luminaires:

1. Attached to structural members in walls.
2. Do not attach luminaires directly to gypsum board.

G. Suspended Luminaires:

1. Ceiling Mount:
  - a. Two 5/32-inch- (4-mm-) diameter aircraft cable supports adjustable to 10 feet (3 m) in length.
  - b. Hook mount.
2. Continuous Rows of Luminaires: Use tubing or stem for wiring at one point and wire support for suspension for each unit length of luminaire chassis, including one at each end.
3. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

H. Ceiling-Grid-Mounted Luminaires:

1. Secure to any required outlet box.
2. Secure luminaire to the luminaire opening using approved fasteners in a minimum of four locations, spaced near corners of luminaire.
3. Use approved devices and support components to connect luminaire to ceiling grid and building structure in a minimum of four locations, spaced near corners of luminaire.

I. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

### 3.4 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

### 3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.

B. Luminaire will be considered defective if it does not pass operation tests and inspections.

C. Prepare test and inspection reports.

3.6 STARTUP SERVICE

A. Comply with requirements for startup specified in Section 260943.16 "Addressable-Luminaire Lighting Controls."

B. Comply with requirements for startup specified in Section 260943.23 "Relay-Based Lighting Controls."

END OF SECTION 265119



## SECTION 270500 - COMMON WORK RESULTS FOR COMMUNICATIONS

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Sleeves for pathways and cables.
2. Sleeve seals.
3. Grout.
4. Common communications installation requirements.

#### 1.2 SUBMITTALS

##### A. Product Data: For sleeve seals.

### PART 2 - PRODUCTS

#### 2.1 SLEEVES FOR PATHWAYS AND CABLES

##### A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

##### B. Sleeves for Rectangular Openings: Galvanized sheet steel.

##### 1. Minimum Metal Thickness:

- a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and no side more than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
- b. 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), thickness shall be 0.138 inch (3.5 mm).

#### 2.2 SLEEVE SEALS

##### A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and pathway or cable.

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

- a. Advance Products & Systems, Inc.
- b. Calpico, Inc.

- c. Metraflex Co.
  - d. Pipeline Seal and Insulator, Inc.
2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of pathway or cable.
  3. Pressure Plates: Plastic. Include two for each sealing element.
  4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

### 2.3 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

## PART 3 - EXECUTION

### 3.1 COMMON REQUIREMENTS FOR COMMUNICATIONS INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both communications equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.

### 3.2 SLEEVE INSTALLATION FOR COMMUNICATIONS PENETRATIONS

- A. Communications penetrations occur when pathways, cables, wireways, or cable trays penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- 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. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

- D. 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.
- E. Cut sleeves to length for mounting flush with both surfaces of walls.
- F. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level.
- G. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pathway or cable, unless indicated otherwise.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
  - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
- I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and pathway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
- J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pathway and cable penetrations. Install sleeves and seal pathway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."
- K. Roof-Penetration Sleeves: Seal penetration of individual pathways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using [steel] [cast-iron] pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- M. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between pathway or cable and sleeve for installing mechanical sleeve seals.

### 3.3 SLEEVE-SEAL INSTALLATION

- A. Install to seal exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for pathway or cable material and size. Position pathway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pathway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

### 3.4 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for communications installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION 270500

## SECTION 271100 - COMMUNICATIONS EQUIPMENT ROOM FITTINGS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Telecommunications mounting elements.
2. Backboards.
3. Telecommunications service entrance pathways.
4. Grounding.

B. Related Sections:

1. Division 27 Section "Communications Backbone Cabling" for voice and data cabling associated with system panels and devices.
2. Division 27 Section "Communications Horizontal Cabling" for voice and data cabling associated with system panels and devices.
3. Division 28 Section "Conductors and Cables for Electronic Safety and Security" for voice and data cabling associated with system panels and devices.

#### 1.2 SUBMITTALS

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

B. Shop Drawings: For communications equipment room fittings. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies, and location and size of each field connection.
2. Equipment racks and cabinets: Include workspace requirements and access for cable connections.
3. Grounding: Indicate location of grounding bus bar and its mounting detail.

C. Qualification Data: For Installer, qualified layout technician, installation supervisor, and field inspector.

#### 1.3 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.

1. Layout Responsibility: Preparation of Shop Drawings shall be under the direct supervision of RCDD.

2. Installation Supervision: Installation shall be under the direct supervision of Registered Technician, who shall be present at all times when Work of this Section is performed at Project site.
  3. Field Inspector: Currently registered by BICSI as RCDD to perform the on-site inspection.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Telecommunications Pathways and Spaces: Comply with TIA/EIA-569-A.
- D. Grounding: Comply with ANSI-J-STD-607-A.

#### 1.4 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install equipment frames and cable trays until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and work above ceilings is complete.

#### 1.5 COORDINATION

- A. Coordinate layout and installation of communications equipment with Owner's telecommunications and LAN equipment and service suppliers. Coordinate service entrance arrangement with local exchange carrier.
1. Meet jointly with telecommunications and LAN equipment suppliers, local exchange carrier representatives, and Owner to exchange information and agree on details of equipment arrangements and installation interfaces.
  2. Record agreements reached in meetings and distribute them to other participants.
  3. Adjust arrangements and locations of distribution frames, cross-connects, and patch panels in equipment rooms to accommodate and optimize arrangement and space requirements of telephone switch and LAN equipment.

### PART 2 - PRODUCTS

#### 2.1 PATHWAYS

- A. Cable Support: NRTL labeled. Cable support brackets shall be designed to prevent degradation of cable performance and pinch points that could damage cable. Cable tie slots fasten cable ties to brackets.
1. Comply with NFPA 70 and UL 2043 for fire-resistant and low-smoke-producing characteristics.
  2. Support brackets with cable tie slots for fastening cable ties to brackets.
  3. Lacing bars, spools, J-hooks, and D-rings.
  4. Straps and other devices.

- B. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems." Flexible metal conduit shall not be used.
  - 1. Outlet boxes shall be no smaller than 2 inches (50 mm) wide, 3 inches (75 mm) high, and 2-1/2 inches (64 mm) deep.

## 2.2 BACKBOARDS

- A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches (19 by 1220 by 2440 mm). Comply with requirements for plywood backing panels specified in Division 06 Section "Rough Carpentry."

## 2.3 GROUNDING

- A. Comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems" for grounding conductors and connectors.
- B. Telecommunications Main Bus Bar:
  - 1. Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.
  - 2. Ground Bus Bar: Copper, minimum 1/4 inch thick by 4 inches wide (6 mm thick by 100 mm wide) with 9/32-inch (7.14-mm) holes spaced 1-1/8 inches (28 mm) apart.
  - 3. Stand-Off Insulators: Comply with UL 891 for use in switchboards, 600 V. Lexan or PVC, impulse tested at 5000 V.
- C. Comply with ANSI-J-STD-607-A.

## 2.4 LABELING

- A. Comply with TIA/EIA-606-A and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

## PART 3 - EXECUTION

### 3.1 ENTRANCE FACILITIES

- A. Contact telecommunications service provider and arrange for installation of demarcation point, protected entrance terminals, and a housing when so directed by service provider.

### 3.2 Install underground entrance pathway complying with Division 26 Section "Raceway and Boxes for Electrical Systems."INSTALLATION

- A. Comply with NECA 1.

- B. Comply with BICSI TDMM for layout and installation of communications equipment rooms.

### 3.3 FIRESTOPPING

- A. Comply with requirements in Division 07 Section "Penetration Firestopping." Comply with TIA/EIA-569-A, Annex A, "Firestopping."
- B. Comply with BICSI TDMM, "Firestopping Systems" Article.

### 3.4 GROUNDING

- A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
- B. Comply with ANSI-J-STD-607-A.
- C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch (50-mm) clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.
- D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

### 3.5 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements in Division 26 Section "Identification for Electrical Systems." Comply with requirements in Division 09 Section "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.
- B. See Division 27 Section "Communications Horizontal Cabling" for additional identification requirements. See Evaluations for discussion of TIA/EIA standard as it applies to this Section. Paint and label colors for equipment identification shall comply with TIA/EIA-606-A for Class 2 level of administration including optional identification requirements of this standard.
- C. Labels shall be preprinted or computer-printed type.

END OF SECTION 271100



## SECTION 271500 - COMMUNICATIONS HORIZONTAL CABLING

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Pathways.
2. UTP cabling.
3. Cable connecting hardware, patch panels, and cross-connects.
4. Telecommunications outlet/connectors.
5. Cabling identification products.
6. Cabling administration system

##### B. Related Sections:

1. Division 27 Section "Communications Backbone Cabling" for voice and data cabling associated with system panels and devices.
2. Division 28 Section "Conductors and Cables for Electronic Safety and Security" for voice and data cabling associated with system panels and devices.

#### 1.2 HORIZONTAL CABLING DESCRIPTION

##### A. Horizontal cable and its connecting hardware provide the means of transporting signals between the telecommunications outlet/connector and the horizontal cross-connect located in the communications equipment room. This cabling and its connecting hardware are called "permanent link," a term that is used in the testing protocols.

1. TIA/EIA-568-B.1 requires that a minimum of two telecommunications outlet/connectors be installed for each work area.
2. Horizontal cabling shall contain no more than one transition point or consolidation point between the horizontal cross-connect and the telecommunications outlet/connector.
3. Bridged taps and splices shall not be installed in the horizontal cabling.

#### 1.3 PERFORMANCE REQUIREMENTS

##### A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA/EIA-568-B.1, when tested according to test procedures of this standard.

#### 1.4 SUBMITTALS

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

##### B. Shop Drawings:

1. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.
2. System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software.
3. Cabling administration drawings and printouts.
4. Wiring diagrams to show typical wiring schematics, including the following:
  - a. Cross-connects.
  - b. Patch panels.
  - c. Patch cords.
5. Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.
6. Cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements. Include the following:
  - C. Qualification Data: For Installer, qualified layout technician, installation supervisor, and field inspector.
  - D. Source quality-control reports.
  - E. Field quality-control reports.
  - F. Maintenance data.

## 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
  1. Layout Responsibility: Preparation of Shop Drawings and Cabling Administration Drawings by an RCDD.
  2. Installation Supervision: Installation shall be under the direct supervision of Registered Technician, who shall be present at all times when Work of this Section is performed at Project site.
- B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  1. Flame-Spread Index: 25 or less.
  2. Smoke-Developed Index: 50 or less.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Telecommunications Pathways and Spaces: Comply with TIA/EIA-569-A.
- E. Grounding: Comply with ANSI-J-STD-607-A.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site. Test each pair of UTP cable for open and short circuits.

## PART 2 - PRODUCTS

### 2.1 PATHWAYS

- A. Cable Support: NRTL labeled for support of Category 6a cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
  - 1. Support brackets with cable tie slots for fastening cable ties to brackets.
  - 2. Lacing bars, spools, J-hooks, and D-rings.
  - 3. Straps and other devices.
- B. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems." Flexible metal conduit shall not be used.
  - 1. Outlet boxes shall be no smaller than 2 inches (50 mm) wide, 3 inches (75 mm) high, and 2-1/2 inches (64 mm) deep.

### 2.2 BACKBOARDS

- A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches (19 by 1220 by 2440 mm). Comply with requirements in Division 06 Section "Rough Carpentry" for plywood backing panels.

### 2.3 UTP CABLE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Belden CDT Inc.; Electronics Division.
  - 2. Berk-Tek; a Nexans company.
  - 3. CommScope, Inc.
  - 4. Draka USA.
  - 5. Genesis Cable Products; Honeywell International, Inc.
  - 6. KRONE Incorporated.
  - 7. Mohawk; a division of Belden CDT.
  - 8. Nordex/CDT; a subsidiary of Cable Design Technologies.
  - 9. Superior Essex Inc.
  - 10. SYSTIMAX Solutions; a CommScope, Inc. brand.
  - 11. 3M.
  - 12. Tyco Electronics/AMP Netconnect; Tyco International Ltd.

- B. Description: 100-ohm, 4-pair UTP, covered with a blue thermoplastic jacket, Category 6a for communications and WIFI access points as shown on the drawings. Provide Category 6 for television outlets as shown on the drawings.
  - 1. Comply with ICEA S-90-661 for mechanical properties.
  - 2. Comply with TIA/EIA-568-B.1 for performance specifications.
  - 3. Comply with TIA/EIA-568-B.2, Category 6a.
  - 4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:
    - a. Communications, Plenum Rated: Type CMP, complying with NFPA 262.
    - b. Communications, Riser Rated: Type CMR, complying with UL 1666.

#### 2.4 UTP CABLE HARDWARE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Panduit Corp.
- B. General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568-B.2, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.
- C. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.
  - 1. Number of Jacks per Field: One for each four-pair conductor group of indicated cables, plus spares and blank positions adequate to suit specified expansion criteria.
- D. Jacks and Jack Assemblies: Modular, color-coded, eight-position modular receptacle units with integral IDC-type terminals.
- E. Patch Cords: Factory-made, four-pair cables in 36-inch (900 mm) lengths; terminated with eight-position modular plug at each end.
  - 1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6a performance. Patch cords shall have latch guards to protect against snagging.
  - 2. Provide two patch cords for each communications jack installed.
- F. Provide floor mounted data racks as shown on the drawings for termination of communications cabling. Provide cable management devices for rack.

## 2.5 TELECOMMUNICATIONS OUTLET/CONNECTORS

- A. Jacks: 100-ohm, balanced, twisted-pair connector; four-pair, eight-position modular. Comply with TIA/EIA-568-B.1.

## 2.6 GROUNDING

- A. Comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems" for grounding conductors and connectors.
- B. Comply with ANSI-J-STD-607-A.

## 2.7 IDENTIFICATION PRODUCTS

- A. Comply with TIA/EIA-606-A and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
- B. Comply with requirements in Division 26 Section "Identification for Electrical Systems."

## 2.8 SOURCE QUALITY CONTROL

- A. Factory test UTP cables on reels according to TIA/EIA-568-B.1.
- B. Factory test UTP cables according to TIA/EIA-568-B.2.
- C. Cable will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

## PART 3 - EXECUTION

### 3.1 ENTRANCE FACILITIES

- A. Coordinate backbone cabling with the protectors and demarcation point provided by communications service provider.

### 3.2 WIRING METHODS

- A. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces, in attics, where unenclosed wiring method may be used. Conceal raceway and cables except in unfinished spaces.

- 1. Install plenum cable in environmental air spaces, including plenum ceilings.

2. Comply with requirements for raceways and boxes specified in Division 26 Section "Raceway and Boxes for Electrical Systems."

- B. Wiring within Enclosures: Bundle, lace, and train cables to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

### 3.3 INSTALLATION OF PATHWAYS

- A. Cable Trays: Comply with NEMA VE 2 and TIA/EIA-569-A-7.
- B. Comply with requirements for demarcation point, pathways, cabinets, and racks specified in Division 27 Section "Communications Equipment Room Fittings." Drawings indicate general arrangement of pathways and fittings.
- C. Comply with TIA/EIA-569-A for pull-box sizing and length of conduit and number of bends between pull points.
- D. Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems" for installation of conduits and wireways.
- E. Install manufactured conduit sweeps and long-radius elbows whenever possible.
- F. Pathway Installation in Communications Equipment Rooms:
  1. Position conduit ends adjacent to a corner on backboard where a single piece of plywood is installed, or in the corner of room where multiple sheets of plywood are installed around perimeter walls of room.
  2. Install cable trays to route cables if conduits cannot be located in these positions.
  3. Secure conduits to backboard when entering room from overhead.
  4. Extend conduits 3 inches (76 mm) above finished floor.
- G. Backboards: Install backboards with 96-inch (2440-mm) dimension vertical. Butt adjacent sheets tightly, and form smooth gap-free corners and joints.

### 3.4 INSTALLATION OF CABLES

- A. Comply with NECA 1.
- B. General Requirements for Cabling:
  1. Comply with TIA/EIA-568-B.1.
  2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
  3. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
  4. Cables may not be spliced. 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.

5. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
6. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
7. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
8. Cold-Weather Installation: Bring cable to room temperature before de-reeling. Heat lamps shall not be used for heating.
9. In the communications equipment room, install a 10-foot- (3-m-) long service loop on each end of cable.
10. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.
11. Provide three communications drops for each communications outlet shown, three communications drops for each cubicle, and one communications drop for each wall mounted telephone shown on the drawings routed to the data rack located at the data room. Coordinate labeling format with owners IT representative.

C. UTP Cable Installation:

1. Comply with TIA/EIA-568-B.2.
2. Do not untwist UTP cables more than 1/2 inch (12 mm) from the point of termination to maintain cable geometry.

D. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend UTP cable not in a wireway or pathway a minimum of 8 inches (200 mm) above ceilings by cable supports not more than 60 inches (1524 mm) apart.
3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

E. Group connecting hardware for cables into separate logical fields.

F. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA/EIA-569-A for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
  - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
  - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (610 mm).

3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
  - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
  - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (300 mm).
4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
  - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
  - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (76 mm).
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

### 3.5 FIRESTOPPING

- A. Comply with requirements in Division 07 Section "Penetration Firestopping."
- B. Comply with TIA/EIA-569-A, Annex A, "Firestopping."
- C. Comply with BICSI TDMM, "Firestopping Systems" Article.

### 3.6 GROUNDING

- A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
- B. Comply with ANSI-J-STD-607-A.
- C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch (50-mm) clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.
- D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.



### 3.7 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
  - 1. Administration Class: [1] [2].
  - 2. Color-code cross-connect fields. Apply colors to voice and data service backboards, connections, covers, and labels.
- B. Comply with requirements in Division 09 Section "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.
- C. Paint and label colors for equipment identification shall comply with TIA/EIA-606-A for Class 2 level of administration, including optional identification requirements of this standard.
- D. 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.
- E. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, 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-A. Furnish electronic record of all drawings, in software and format selected by Owner.
- F. Cable and Wire Identification:
  - 1. 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.
  - 2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
  - 3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet (4.5 m).
  - 4. Label each terminal strip and screw terminal in each cabinet, rack, or panel.
    - a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with name and number of particular device as shown.
    - b. Label each unit and field within distribution racks and frames.
  - 5. Identification 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.

6. Uniquely identify and label work area cables extending from the MUTOA to the work area. These cables may not exceed the length stated on the MUTOA label.
- G. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA-606-A.
1. Cables use flexible vinyl or polyester that flex as cables are bent.

### 3.8 FIELD QUALITY CONTROL

#### A. Tests and Inspections:

1. Visually inspect UTP cable jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568-B.1.
2. Visually confirm Category 6a, marking of outlets, cover plates, outlet/connectors, and patch panels.
3. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
4. Test UTP backbone copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.
  - a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
5. UTP Performance Tests:
  - a. Test for each outlet. Perform the following tests according to TIA/EIA-568-B.1 and TIA/EIA-568-B.2:
    - 1) Wire map.
    - 2) Length (physical vs. electrical, and length requirements).
    - 3) Insertion loss.
    - 4) Near-end crosstalk (NEXT) loss.
    - 5) Power sum near-end crosstalk (PSNEXT) loss.
    - 6) Equal-level far-end crosstalk (ELFEXT).
    - 7) Power sum equal-level far-end crosstalk (PSELFEXT).
    - 8) Return loss.
    - 9) Propagation delay.
    - 10) Delay skew.

- B. Document data for each measurement. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.
- C. Prepare test and inspection reports.

### 3.9 DEMONSTRATION

- A. Train Owner's maintenance personnel in cable-plant management operations, including changing signal pathways for different workstations, rerouting signals in failed cables, and keeping records of cabling assignments and revisions when extending wiring to establish new workstation outlets.

END OF SECTION 271500

## SECTION 280500 - COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Sleeves for raceways and cables.
2. Sleeve seals.
3. Grout.
4. Common electronic safety and security installation requirements.

#### 1.2 SUBMITTALS

##### A. Product Data: For sleeve seals.

### PART 2 - PRODUCTS

#### 2.1 SLEEVES FOR RACEWAYS AND CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Sleeves for Rectangular Openings: Galvanized sheet steel.
  1. Minimum Metal Thickness:
    - a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and no side more than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
    - b. 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), thickness shall be 0.138 inch (3.5 mm).

#### 2.2 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Advance Products & Systems, Inc.
  - b. Calpico, Inc.
  - c. Metraflex Co.
  - d. Pipeline Seal and Insulator, Inc.
2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
3. Pressure Plates: Plastic. Include two for each sealing element.
4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

## 2.3 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

## PART 3 - EXECUTION

### 3.1 COMMON REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electronic safety and security equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.

### 3.2 SLEEVE INSTALLATION FOR ELECTRONIC SAFETY AND SECURITY PENETRATIONS

- A. Electronic safety and security penetrations occur when raceways, pathways, cables, wireways, or cable trays penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- 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. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. 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.
- E. Cut sleeves to length for mounting flush with both surfaces of walls.
- F. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level.
- G. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable, unless indicated otherwise.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
  - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
- I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
- J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."
- K. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- M. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

### 3.3 SLEEVE-SEAL INSTALLATION

- A. Install to seal exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

### 3.4 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electronic safety and security installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION 280500

## SECTION 280513 - CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. UTP cabling.
2. Coaxial cabling.
3. RS-232 cabling.
4. RS-485 cabling.
5. Low-voltage control cabling.
6. Control-circuit conductors.
7. Fire alarm wire and cable.
8. Identification products.

#### 1.2 DEFINITIONS

- A. BICSI: Building Industry Consulting Service International.
- B. EMI: Electromagnetic interference.
- C. IDC: Insulation displacement connector.
- D. Open Cabling: Passing telecommunications cabling through open space (e.g., between the studs of a wall cavity).
- E. RCDD: Registered Communications Distribution Designer.

#### 1.3 PERFORMANCE REQUIREMENTS

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Qualification Data: For qualified layout technician, installation supervisor, and field inspector.
- C. Source quality-control reports.
- D. Field quality-control reports.
- E. Operation and maintenance data.



## 1.5 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame-Spread Index: 25 or less.
  - 2. Smoke-Developed Index: 50 or less.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site.
  - 1. Test each pair of UTP cable for open and short circuits.

## 1.7 PROJECT CONDITIONS

- A. Do not install conductors and cables that are wet, moisture damaged, or mold damaged.
  - 1. Indications that wire and cables are wet or moisture damaged include, but are not limited to, discoloration and sagging of factory packing materials.
- B. Environmental Limitations: Do not deliver or install UTP, optical fiber, and coaxial cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

## PART 2 - PRODUCTS

### 2.1 PATHWAYS

- A. Support of Open Cabling: NRTL labeled for support of Category 6 cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
- B. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems." Flexible metal conduit shall not be used.
  - 1. Outlet boxes shall be no smaller than 2 inches (50 mm) wide, 3 inches (75 mm) high, and 2-1/2 inches (64 mm) deep.

## 2.2 BACKBOARDS

- A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches (19 by 1220 by 2440 mm). Comply with requirements for plywood backing panels in Division 06 Section "Rough Carpentry".

## 2.3 UTP CABLE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. ADC.
  - 2. AMP Netconnect; a brand of Tyco Electronics Corporation.
  - 3. Belden CDT Networking Division/NORDX.
  - 4. Belden Inc.
  - 5. Berk-Tek; a Nexans company.
  - 6. CommScope, Inc.
  - 7. Draka Cableteq USA.
  - 8. Genesis Cable Products; Honeywell International, Inc.
  - 9. Mohawk; a division of Belden.
  - 10. Superior Essex Inc.
  - 11. SYSTIMAX Solutions; a CommScope, Inc. brand.
  - 12. 3M; Communication Markets Division.
  
- B. Description: 100-ohm, 4-pair UTP, covered with a blue thermoplastic jacket.
  - 1. Comply with ICEA S-90-661 for mechanical properties.
  - 2. Comply with TIA/EIA-568-B.1 for performance specifications.
  - 3. Comply with TIA/EIA-568-B.2, Category 6.
  - 4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:
    - a. Communications, Plenum Rated: Type CMP, complying with NFPA 262.
    - b. Communications, Riser Rated: Type CMR[; or MPP, CMP, or MPR], complying with UL 1666.
    - c. Communications, Limited Purpose: Type CMX.
    - d. Multipurpose: Type MP or MPG.
    - e. Multipurpose, Plenum Rated: Type MPP, complying with NFPA 262.
    - f. Multipurpose, Riser Rated: Type MPR, complying with UL 1666.

## 2.4 UTP CABLE HARDWARE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. ADC.
  - 2. American Technology Systems Industries, Inc.
  - 3. AMP Netconnect; a brand of Tyco Electronics Corporation.

4. Belden CDT Networking Division/NORDX.
5. Dynacom Corporation.
6. Hubbell Incorporated; Hubbell Premise Wiring.
7. Leviton Voice & Data Division.
8. Molex Premise Networks; a division of Molex, Inc.
9. PANDUIT CORP.
10. Siemon.

- B. UTP Cable Connecting Hardware: IDC type, using modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of the same category or higher.
- C. Connecting Blocks: 110-style for Category 6. Provide blocks for the number of cables terminated on the block, plus 25 percent spare. Integral with connector bodies, including plugs and jacks where indicated.

## 2.5 RS-232 CABLE

- A. Standard Cable: NFPA 70, Type CM.
  1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
  2. Polypropylene insulation.
  3. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
  4. PVC jacket.
  5. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
  6. Flame Resistance: Comply with UL 1581.
- B. Plenum-Rated Cable: NFPA 70, Type CMP.
  1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
  2. Plastic insulation.
  3. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
  4. Plastic jacket.
  5. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
  6. Flame Resistance: Comply with NFPA 262.

## 2.6 RS-485 CABLE

- A. Standard Cable: NFPA 70, Type CM.
  1. Paired, 2 pairs, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors.
  2. PVC insulation.
  3. Unshielded.
  4. PVC jacket.
  5. Flame Resistance: Comply with UL 1581.

- B. Plenum-Rated Cable: NFPA 70, Type CMP.
  - 1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
  - 2. Fluorinated ethylene propylene insulation.
  - 3. Unshielded.
  - 4. Fluorinated ethylene propylene jacket.
  - 5. Flame Resistance: NFPA 262, Flame Test.

## 2.7 LOW-VOLTAGE CONTROL CABLE

- A. Paired Cable: NFPA 70, Type CMG.
  - 1. 1 pair, twisted, No. 16 AWG, stranded (19x29) and No. 18 AWG, stranded (19x30) tinned copper conductors.
  - 2. PVC insulation.
  - 3. Unshielded.
  - 4. PVC jacket.
  - 5. Flame Resistance: Comply with UL 1581.
- B. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.
  - 1. 1 pair, twisted, No. 16 AWG, stranded (19x29) No. 18 AWG, stranded (19x30) tinned copper conductors.
  - 2. PVC insulation.
  - 3. Unshielded.
  - 4. PVC jacket.
  - 5. Flame Resistance: Comply with NFPA 262.

## 2.8 CONTROL-CIRCUIT CONDUCTORS

- A. Class 1 Control Circuits: Stranded copper, Type THHN-THWN, complying with UL 83, in raceway.
- B. Class 2 Control Circuits: Stranded copper, power-limited cable, complying with UL 83, concealed in building finishes.
- C. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type TW or TF, complying with UL 83.

## 2.9 FIRE ALARM WIRE AND CABLE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Comtran Corporation.
  - 2. Draka Cableteq USA.
  - 3. Genesis Cable Products; Honeywell International, Inc.

4. Rockbestos-Suprenant Cable Corp.
  5. West Penn Wire; a brand of Belden Inc.
- B. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760.
- C. Signaling Line Circuits: Twisted, shielded pair, size as recommended by system manufacturer.
1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70, Article 760, Classification CI, for power-limited fire alarm signal service Type FPL. NRTL listed and labeled as complying with UL 1424 and UL 2196 for a 2-hour rating.
- D. 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.

## 2.10 IDENTIFICATION PRODUCTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Brady Corporation.
  2. HellermannTyton.
  3. Kroy LLC.
  4. PANDUIT CORP.
- B. Comply with UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
- C. Comply with requirements in Division 26 Section "Identification for Electrical Systems."

## 2.11 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory test UTP cables according to TIA/EIA-568-B.2.
- C. Cable will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF PATHWAYS

- A. Cable Trays: Comply with NEMA VE 2 and TIA-569-B.
- B. Comply with TIA-569-B for pull-box sizing and length of conduit and number of bends between pull points.
- C. Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems." for installation of conduits and wireways.
- D. Install manufactured conduit sweeps and long-radius elbows whenever possible.
- E. Pathway Installation in Equipment Rooms:
  - 1. Position conduit ends adjacent to a corner on backboard where a single piece of plywood is installed or in the corner of room where multiple sheets of plywood are installed around perimeter walls of room.
  - 2. Install cable trays to route cables if conduits cannot be located in these positions.
  - 3. Secure conduits to backboard when entering room from overhead.
  - 4. Extend conduits 3 inches (75 mm) above finished floor.
  - 5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.
- F. Backboards: Install backboards with 96-inch (2440-mm) dimension vertical. Butt adjacent sheets tightly, and form smooth gap-free corners and joints.

### 3.2 INSTALLATION OF HANGERS AND SUPPORTS

- A. Comply with requirements in Division 26 Section "Hangers and Supports for Electrical Systems." for installation of supports for pathways, conductors and cables.

### 3.3 WIRING METHOD

- A. Install wiring in metal raceways and wireways. Conceal raceway except in unfinished spaces and as indicated. Minimum conduit size shall be [3/4 inch (21 mm)] <Insert size>. Control and data transmission wiring shall not share conduit with other building wiring systems.
- B. Install wiring in raceways except in accessible indoor ceiling spaces where cable may be used. Conceal raceways and wiring except in unfinished spaces and as indicated. Minimum conduit size shall be [1/2 inch]. Control and data transmission wiring shall not share conduit with other building wiring systems.
- C. Install cable, concealed in accessible ceilings, walls, and floors when possible.

- D. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points. Use lacing bars and distribution spools. Separate power-limited and non-power-limited conductors as recommended in writing by manufacturer. Install conductors parallel with or at right angles to sides and back of enclosure. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with intrusion system to terminal blocks. Mark each terminal according to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

### 3.4 INSTALLATION OF CONDUCTORS AND CABLES

- A. Comply with NECA 1.
- B. Conductors: Size according to system manufacturer's written instructions unless otherwise indicated.
- C. General Requirements for Cabling:
  - 1. Comply with TIA/EIA-568-B.1.
  - 2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
  - 3. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.
  - 4. Cables may not be spliced. 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.
  - 5. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
  - 6. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
  - 7. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
  - 8. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.
- D. UTP Cable Installation: Install 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.
  - 1. Comply with TIA/EIA-568-B.2.
  - 2. Install 110-style IDC termination hardware unless otherwise indicated.
  - 3. Do not untwist UTP cables more than 1/2 inch (12 mm) from the point of termination to maintain cable geometry.
- E. Open-Cable Installation:
  - 1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.

2. Suspend copper cable not in a wireway or pathway a minimum of 8 inches (200 mm) above ceilings by cable supports not more than 60 inches (1525 mm) apart.
3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

F. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA-569-B recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
  - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
  - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (600 mm).
3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
  - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
  - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (300 mm).
4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
  - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
  - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (75 mm).
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).
5. Separation between Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).
6. Separation between Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

### 3.5 FIRE ALARM WIRING INSTALLATION

- A. Comply with NECA 1 and NFPA 72.



- B. Wiring Method:
  - 1. Cables may be installed above accessible ceiling spaces without raceway. Cables shall be installed in concealed raceways in walls and finished areas. Cables and raceways used for fire alarm circuits, and equipment control wiring associated with the fire alarm system, may not contain any other wire or cable.
  - 2. Signaling Line Circuits: Power-limited fire alarm cables may be installed in the same cable or raceway as signaling line circuits.
- C. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.
- D. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.
- E. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and another for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire alarm system junction boxes and covers red.
- F. Wiring to Remote Alarm Transmitting Device: 1-inch (25-mm) conduit between the fire alarm control panel and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

### 3.6 POWER AND CONTROL-CIRCUIT CONDUCTORS

- A. 120-V Power Wiring: Install according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables" unless otherwise indicated.
- B. Minimum Conductor Sizes:
  - 1. Class 1 remote-control and signal circuits, No. 14 AWG.
  - 2. Class 2 low-energy, remote-control and signal circuits, No. 16 AWG.
  - 3. Class 3 low-energy, remote-control, alarm and signal circuits, No. 12 AWG.

### 3.7 CONNECTIONS

- A. Comply with requirements in Division 28 Section "Digital Addressable Fire-Alarm System" for connecting, terminating, and identifying wires and cables.

### 3.8 FIRESTOPPING

- A. Comply with requirements in Division 07 Section "Penetration Firestopping."
- B. Comply with TIA-569-B, "Firestopping" Annex A.
- C. Comply with BICSI TDMM, "Firestopping Systems" Article.

### 3.9 GROUNDING

- A. For communications wiring, comply with ANSI-J-STD-607-A and with BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
- B. For low-voltage wiring and cabling, comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems."

### 3.10 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

### 3.11 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
  - 1. Visually inspect UTP and optical fiber cable jacket materials for NRTL certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA/EIA-568-B.1.
  - 2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
  - 3. Test UTP cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross connection.
    - a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

- D. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.
- E. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

END OF SECTION 280513

## SECTION 283111 - DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
1. Fire-alarm control unit.
  2. Manual fire-alarm boxes.
  3. System smoke detectors.
  4. Heat detectors.
  5. Notification appliances.
  6. Magnetic door holders.
  7. Remote annunciator.
  8. Addressable interface device.
  9. Digital alarm communicator transmitter.

#### 1.2 SYSTEM DESCRIPTION

- A. Expansion to a Noncoded, addressable system, with multiplexed signal transmission, dedicated to fire-alarm service only.

#### 1.3 SUBMITTALS

- A. General Submittal Requirements:
1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Architect.
  2. Shop Drawings shall be prepared by persons with the following qualifications:
    - a. Trained and certified by manufacturer in fire-alarm system design.
    - b. NICET-certified fire-alarm technician, Level III minimum.
- B. Product Data: For each type of product indicated.
- C. Shop Drawings: For fire-alarm system. Include plans, elevations, sections, details, and attachments to other work.
1. Comply with recommendations in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72.
  2. Include voltage drop calculations for notification appliance circuits.
  3. Include battery-size calculations.

4. Include performance parameters and installation details for each detector, verifying that each detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
  5. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale and coordinating installation of duct smoke detectors and access to them. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators. Locate detectors according to manufacturer's written recommendations.
- D. Qualification Data: For qualified Installer.
- E. Field quality-control reports.
- F. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
1. Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
  2. Provide "Record of Completion Documents" according to NFPA 72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter.
  3. Record copy of site-specific software.
  4. Provide "Maintenance, Inspection and Testing Records" according to NFPA 72 article of the same name and include the following:
    - a. Frequency of testing of installed components.
    - b. Frequency of inspection of installed components.
    - c. Requirements and recommendations related to results of maintenance.
    - d. Manufacturer's user training manuals.
  5. Manufacturer's required maintenance related to system warranty requirements.
  6. Abbreviated operating instructions for mounting at fire-alarm control unit.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm Level III technician.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

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

1. Siemens Building Technologies, Inc.; Fire Safety Division.

## 2.2 SYSTEMS OPERATIONAL DESCRIPTION

- A. Fire-alarm signal initiation shall be by one or more of the following devices and systems with the exception of the smoke detectors located in the guest units which shall initiate a trouble condition and operate the sounder bases in the corresponding guest room only:
  1. Manual stations.
  2. Heat detectors.
  3. Smoke detectors.
  4. Duct smoke detectors.
  5. Fire-extinguishing system operation.
- B. Fire-alarm signal shall initiate the following actions:
  1. Continuously operate alarm-notification appliances.
  2. Identify alarm at the fire-alarm control unit and remote annunciators.
  3. Transmit an alarm signal to the remote alarm receiving station.
  4. Unlock electric door locks in designated egress paths.
  5. Release fire and smoke doors held open by magnetic door holders.
  6. Recall elevators to primary or alternate recall floors.
  7. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
  8. Record events in the system memory.
- C. Supervisory signal initiation shall be by one or more of the following devices and actions:
  1. Valve supervisory switch.
  2. Low-air-pressure switch of a dry-pipe sprinkler system.
  3. Elevator shunt-trip supervision.
- D. System trouble signal initiation shall be by one or more of the following devices and actions:
  1. Open circuits, shorts, and grounds in designated circuits.
  2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
  3. Loss of primary power at fire-alarm control unit.
  4. Ground or a single break in fire-alarm control unit internal circuits.
  5. Abnormal ac voltage at fire-alarm control unit.
  6. Break in standby battery circuitry.
  7. Failure of battery charging.
  8. Abnormal position of any switch at fire-alarm control unit or annunciator.
- E. System Trouble and Supervisory Signal Actions: Initiate notification appliance and annunciate at fire-alarm control unit and remote annunciators.

## 2.3 FIRE-ALARM CONTROL UNIT

### A. General Requirements for Fire-Alarm Control Unit:

1. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864 and listed and labeled by an NRTL.
  - a. System software and programs shall be held in flash electrically erasable programmable read-only memory (EEPROM), retaining the information through failure of primary and secondary power supplies.
  - b. Include a real-time clock for time annotation of events on the event recorder and printer.
2. Addressable control circuits for operation of mechanical equipment.

### B. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.

1. Annunciator and Display: Liquid-crystal type, 2 line(s) of 80 characters, minimum.
2. Keypad: Arranged to permit entry and execution of programming, display, and control commands and to indicate control commands to be entered into the system for control of smoke-detector sensitivity and other parameters.

### C. Circuits:

1. Initiating Device, Notification Appliance, and Signaling Line Circuits: NFPA 72, Class B.
  - a. Initiating Device Circuits: Style B.
  - b. Notification Appliance Circuits: Style X.
  - c. Signaling Line Circuits: Style 4.
  - d. Install no more than 50 addressable devices on each signaling line circuit.

### D. Notification Appliance Circuit: Operation shall sound in a temporal code.

### E. Elevator Recall:

1. Smoke detectors at the following locations shall initiate automatic elevator recall.
  - a. Elevator lobby detectors except the lobby detector on the designated floor.
  - b. Smoke detector in elevator machine room.
  - c. Smoke detectors in elevator hoistway.
2. Elevator lobby detectors located on the designated recall floors shall be programmed to move the cars to the alternate recall floor.
3. Water-flow alarm connected to sprinkler in an elevator shaft and elevator machine room shall shut down elevators associated with the location without time delay.

- a. Water-flow switch associated with the sprinkler in the elevator pit may have a delay to allow elevators to move to the designated floor.
- F. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke barrier walls shall be connected to fire-alarm system.
- G. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.
- H. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory and digital alarm communicator transmitters shall be powered by 24-V dc source.
  - 1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.
- I. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.
  - 1. Batteries: Sealed lead calcium.
- J. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

## 2.4 MANUAL FIRE-ALARM BOXES

- A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
  - 1. Single-action mechanism, breaking-glass or plastic-rod type. With integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
  - 2. Station Reset: Key- or wrench-operated switch.

## 2.5 SYSTEM SMOKE DETECTORS

- A. General Requirements for System Smoke Detectors:
  - 1. Comply with UL 268; operating at 24-V dc, nominal.
  - 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
  - 3. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.



4. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
5. Integral Visual-Indicating Light: LED type indicating detector has operated and power-on status.
6. Sounder bases for smoke detectors installed in resident rooms.

B. Photoelectric Smoke Detectors:

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
  - a. Primary status.
  - b. Device type.
  - c. Present average value.
  - d. Present sensitivity selected.
  - e. Sensor range (normal, dirty, etc.).

C. Duct Smoke Detectors: Photoelectric type complying with UL 268A.

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
  - a. Primary status.
  - b. Device type.
  - c. Present average value.
  - d. Present sensitivity selected.
  - e. Sensor range (normal, dirty, etc.).
3. Each sensor shall have multiple levels of detection sensitivity.
4. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
5. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.

## 2.6 HEAT DETECTORS

A. General Requirements for Heat Detectors: Comply with UL 521.

B. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F (57 deg C) or a rate of rise that exceeds 15 deg F (8 deg C) per minute unless otherwise indicated.

1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

- C. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of 190 deg F (88 deg C).
  - 1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
  - 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

## 2.7 NOTIFICATION APPLIANCES

- A. General Requirements for Notification Appliances: Connected to notification appliance signal circuits, zoned as indicated, equipped for mounting as indicated and with screw terminals for system connections.
  - 1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated and with screw terminals for system connections.
- B. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet (3 m) from the horn, using the coded signal prescribed in UL 464 test protocol.
- C. Visible Notification Appliances: Xenon strobe lights comply with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch-(25-mm-) high letters on the lens.
  - 1. Mounting: Wall mounted unless otherwise indicated.
  - 2. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
  - 3. Flashing shall be in a temporal pattern, synchronized with other units.
  - 4. Strobe Leads: Factory connected to screw terminals.
  - 5. Mounting Faceplate: Factory finished, white.
  - 6. High output strobes located in sensory impaired guest rooms as shown on the drawings.

## 2.8 MAGNETIC DOOR HOLDERS

- A. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching doorplate.
  - 1. Electromagnet: Requires no more than 3 W to develop 25-lbf (111-N) holding force.
  - 2. Wall-Mounted Units: Flush mounted unless otherwise indicated.
  - 3. Rating: 24-V ac or dc.
- B. Material and Finish: Match door hardware.

## 2.9 REMOTE ANNUNCIATOR

- A. Description: Annunciator functions shall match those of fire-alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control unit, including acknowledging, silencing, resetting, and testing.
  - 1. Mounting: Flush cabinet, NEMA 250, Type 1.
- B. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire-alarm control unit. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.

## 2.10 ADDRESSABLE INTERFACE DEVICE

- A. Description: Microelectronic monitor module, NRTL listed for use in providing a system address for alarm-initiating devices for wired applications with normally open contacts.

## 2.11 DIGITAL ALARM COMMUNICATOR TRANSMITTER

- A. Digital alarm communicator transmitter shall be acceptable to the remote central station and shall comply with UL 632 and be listed and labeled by an NRTL.
- B. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit and automatically capture two telephone line(s) and dial a preset number for a remote central station. When contact is made with central station(s), signals shall be transmitted. If service on either line is interrupted for longer than 45 seconds, transmitter shall initiate a local trouble signal and transmit the signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. Transmitter shall automatically report telephone service restoration to the central station. If service is lost on both telephone lines, transmitter shall initiate the local trouble signal.
- C. Local functions and display at the digital alarm communicator transmitter shall include the following:
  - 1. Verification that both telephone lines are available.
  - 2. Programming device.
  - 3. LED display.
  - 4. Manual test report function and manual transmission clear indication.
  - 5. Communications failure with the central station or fire-alarm control unit.
- D. Digital data transmission shall include the following:
  - 1. Address of the alarm-initiating device.
  - 2. Address of the supervisory signal.
  - 3. Address of the trouble-initiating device.
  - 4. Loss of ac supply or loss of power.
  - 5. Low battery.
  - 6. Abnormal test signal.

- 7. Communication bus failure.
- E. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

### PART 3 - EXECUTION

#### 3.1 EQUIPMENT INSTALLATION

- A. Comply with NFPA 72 for installation of fire-alarm equipment.
- B. Smoke- or Heat-Detector Spacing:
  - 1. Comply with NFPA 72, "Smoke-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for smoke-detector spacing.
  - 2. Comply with NFPA 72, "Heat-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for heat-detector spacing.
  - 3. Smooth ceiling spacing shall not exceed 30 feet (9 m).
  - 4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Appendix A in NFPA 72.
  - 5. HVAC: Locate detectors not closer than 3 feet (1 m) from air-supply diffuser or return-air opening.
  - 6. Lighting Fixtures: Locate detectors not closer than 12 inches (300 mm) from any part of a lighting fixture.
- C. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct.
- D. Remote Status and Alarm Indicators: Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.
- E. Audible Alarm-Indicating Devices: Install not less than 6 inches (150 mm) below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille.
- F. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches (150 mm) below the ceiling.
- G. Device Location-Indicating Lights: Locate in public space near the device they monitor.
- H. Fire-Alarm Control Unit: Surface mounted, with tops of cabinets not more than 72 inches (1830 mm) above the finished floor.
- I. Annunciator: Install with top of panel not more than 72 inches (1830 mm) above the finished floor.

### 3.2 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
- B. Install framed instructions in a location visible from fire-alarm control unit.

### 3.3 GROUNDING

- A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

### 3.4 FIELD QUALITY CONTROL

- A. Field tests shall be witnessed by authorities having jurisdiction.
- B. Tests and Inspections:
  - 1. Visual Inspection: Conduct visual inspection prior to testing.
    - a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.
    - b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
  - 2. System Testing: Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
  - 3. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
- C. Fire-alarm system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION 283111